# Enforcement versus Management

## *Comparing Two Analyses of Compliance in and Effectiveness of International Environmental Regimes*

Hanne Elisabeth Hovden


Master thesis
Department of Political Science

UNIVERSITY OF OSLO

November 2010

# Enforcement versus Management

*Comparing Two Analyses of Compliance in and Effectiveness of International Environmental Regimes*

2010

Enforcement versus Management

Hanne Elisabeth Hovden

http://www.duo.uio.no/

Trykk: Reprosentralen, Universitetet i Oslo

# Acknowledgements

I would like to express my sincere gratitude to my supervisor professor Jon Hovi for outstanding guidance throughout the process of writing this thesis (Fall 2009 and Fall 2010). Thank you for your patience, always constructive comments, and impressive dedication to supervising students.

I would also like to thank my friend Jody Meacham, journalist and author of Hamlet, North Carolina, for invaluable reviews and comments on the language.

Thank you also to my parents, Wenche and Arne, and my brother, Øyvind, for encouragement and support throughout the process.

Last but not least, I would like to thank my fiancé Einar for being there for me, always.

The mistakes and shortcomings of the thesis are entirely my own.

Hanne Elisabeth Hovden,

Oslo, November 22, 2010

Words: 22 674

# Content

# 1 Introduction

Within the literature and research on international regimes, there is an ongoing debate about the need for enforcement. Do regimes need enforcement mechanisms in order to get member states to comply with their commitments? The "enforcement school" and "management school"[1] have diverging views on this. Advocates of the enforcement school emphasize the need for strong enforcement mechanisms to ensure the member states' compliance, whereas the management school stresses the need for capacity building and other facilitative mechanisms in order to accommodate compliance.

In Helmut Breitmeier, Oran Young and Michael Zürn's book (2006) entitled *Analyzing International Environmental Regimes*, two of the authors have each done statistical analyses using data from the International Regimes Database (IRD). Chapter 3 in the book, mainly written by Michael Zürn[2], examines horizontal mechanisms for inducing compliance. Chapter 4, mainly written by Oran Young, examines the effect of decision rules and compliance mechanisms on regime effectiveness. There are several similarities between the two analyses: they use the same dataset and the same analytical technique, they have one independent variable in common, and even though their dependent constructs (compliance and regime effectiveness) differ, they are closely related.

Nevertheless, Young and Zürn arrive at very different conclusions: Zürn concludes that enforcement mechanisms are essential for compliance: "…evidence drawn from the IRD indicates clearly that international environmental regimes that establish mechanisms of horizontal sanctioning and strong verification procedures do better than average with regard to compliance" (Breitmeier et al 2006:110). Young finds most support for the management school: "Regimes that rely on a management approach succeed in fulfilling goals 86.1 percent

[1] The management school is also frequently termed the "managerial school". In this thesis, management school is the preferred term.

[2] Officially, all chapters in the book are written by all three authors (Breitmeier, Young and Zürn). However, it seemed strange to me that two chapters with such different conclusions were written by the same authors. A suspicion that Zürn was the author behind chapter 3 and Young the author behind chapter 4 was confirmed by the authors through e-mail correspondence. In an e-mail dated 13.10.10, Michael Zürn writes: "… your assumptions about the authorship contains certainly some truth (and you certainly can express this in your thesis) ..." In an e-mail dated 12.10.10, Oran Young writes: "Well, your guess is not completely off base. Michael prepared the FIRST draft of Ch. 3, while I did the same for Ch. 4. BUT it is important to note that the book is a fully joint work in the sense that we all signed onto the whole text."

of the time …" (Breitmeier et al 2006:190) and concludes that "… the evidence we have presented in this chapter suggests that there is no reason to dismiss international regimes because of their … tendency to avoid familiar enforcement mechanisms" (Breitmeier et al 2006:190).

## 1.1 Research question

In this thesis, I take a closer look at Young and Zürn's analyses in order to identify *why* the two authors conclude so differently. The research question for this thesis is as follows:

*What explains why Young and Zürn have reached different conclusions with regard to compliance mechanisms, compliance and regime effectiveness despite the many similarities of their analyses?*

## 1.2 Theoretical background

### 1.2.1 Compliance and regime effectiveness

Compliance within international environmental regimes "can be said to occur when the actual behavior of a given subject conforms to prescribed behavior, and non-compliance or violation occurs when actual behavior departs significantly from prescribed behavior" (Young cited in Breitmeier et al 2006:65). Compliance thus refers to a situation where the member states' actions are in accordance with the regime's rules and regulations. However, it is important to notice that compliance is no direct indicator of a regime's effectiveness nor an indicator of actual effects of the regime in nature: "Compliance differs from other topics dealing with the consequences of regulations, including their implementation and effectiveness" (Breitmeier et al 2006:64).

Incentives for compliance is one of three necessary components of regime effectiveness, according to Barrett (2006:242). This links compliance closely to regime effectiveness. The other two components needed for a regime to be effective are broad participation and deep commitments (Barrett 2006:244). According to Underdal (2002:4), "a regime can be considered effective to the extent that it successfully performs a certain (set of) function(s) or solves the problem(s) that motivated its establishment."

### 1.2.2 Approaches to compliance

There is significant disagreement among researchers regarding what mechanisms are needed to make states comply with international environmental agreements. Scholars differ over whether positive and negative compliance mechanisms are required, or if facilitative mechanisms are sufficient. In other words, they disagree about the need for enforcement.

The two main perspectives on enforcement and compliance within this area of research are the enforcement school and the management school. The social-practice perspective is a third approach. The enforcement school emphasizes the need for strict enforcement by making use of positive and negative incentives. "Carrots" are positive incentives such as side payments, issue linkages or other additional entitlements (like additional emission permits) (Barrett and Stavins 2003:360-361). "Sticks," on the other hand, are negative incentives – mechanisms for punishment if states are non-compliant. Examples include trade restrictions and lower emission permits, economic punishments and suspension of member privileges (such as voting rights) (Barrett and Stavins 2003:362-365). This school argues that states are concerned primarily with their national interest, and use a cost-benefit calculus when deciding whether or not to comply. If the benefit of complying is greater than the cost, one will choose to comply but if the opposite is true, the chances for compliant behavior are small (Breitmeier et al 2006:149).

The other school of thought, the management school, views norms, knowledge and capacity building as the most important determinants for compliant behavior. A basic norm in international law is that all international laws should be obeyed: *pacta sunt servanda* – "treaties are to be obeyed" (Chayes and Chayes 1995:185). Such a norm reduces the need for use of enforcement and coercion. States generally want to comply with treaty obligations. When states are in noncompliance, this is not due to the fact that they do not want to comply but rather due to inability to comply. Chayes and Chayes (1995:188-196) identify several reasons for non-compliance: The treaty's ambiguity, the states' capacity (or lack of capacity) to comply and insufficient time to adjust to regulations prescribed by a treaty. The first reason, ambiguity, implies that words in the agreements can be misinterpreted or misunderstood. Ambiguity is often the result of long and difficult multilateral negotiations, where the agreed text is twisted and turned in order to meet all countries' concerns. Understanding the different wordings properly can be challenging and thus states may become unsure what is compliant behavior and what is not (Chayes and Chayes 1995:188,

189). The second reason concerns different limitations in a state's capacity to comply with an agreement. Insufficient technological capacity or lack of economic or political resources are examples of this. Weak national bureaucratic structures and regulating capacity are other aspects (Chayes and Chayes 1995:193, 194). States need scientific, technical, bureaucratic and financial capacity in order to create national enforcement systems for the agreement. The third reason for non-compliance, "the temporal dimension" (Chayes and Chayes 1995:195), concerns the time it takes for a country to adjust to regulations prescribed by a treaty: "Significant changes in social or economic systems mandated by regulatory treaties take time to accomplish" (Chayes and Chayes 1995:195). A period of transition between the undertaking and implementation of an agreement may be necessary in order to adjust national systems.

The social practice approach to compliance advocates that "actors are likely to comply with the provisions of the regimes for reasons that do not lend themselves to calculations of benefits and costs …" (Breitmeier et al 2006:155). In this perspective, incentives play a minor role; a logic of appropriateness motivates actors to comply. Compliance depends upon the overall character of the regime, and especially the attitudes of the parties toward the regime, rather than well-defined compliance mechanisms (Breitmeier et al 2006:155).

## 1.3 Michael Zürn's analysis

In chapter 3 in *Analyzing International Environmental Regimes* (Breitmeier et al 2006), Michael Zürn analyzes the effect of horizontal compliance mechanisms on compliance rates. Compliance is the dependent construct examined in Zürn's analysis. He includes four independent constructs: incentives, legalization, legitimization and responsiveness. Each of these constructs represents ways to cope with non-compliance problems (Breitmeier et al 2006:72). These constructs are mechanisms for coping with four different sources of non-compliance: cheating, the ambiguity of rules, a rule or norm is considered to be wrong, or the rule is impractical to comply with for the country in question (Breitmeier et al 2006:71). He finds that the first construct, incentives, has the strongest positive effect on compliance. At the same time, he finds that capacity building and negotiations are insufficient to achieve high levels of compliance. These results give support to the enforcement school. Results from Zürn's analyses also show that juridification has a positive effect on compliance levels. "Juridification" implies that rules and regulations are explicit, precise, stringent and

consistent. To ensure precise and explicit rules, power is delegated to institutions that are largely autonomous, such as national and international courts or tribunals. These institutions develop and interpret the rules (Breitmeier et al 2006:79). In this way, ambiguity can be avoided.

Zürn's results show that "efforts to promote compliance through negotiations and various forms of capacity building are not sufficient to induce compliance with international rules and regulations" (Breitmeier et al 2006:110). This finding gives little support to the management school. He concludes that: "Most successful regimes rely on compliance mechanisms involving horizontal sanctioning and institutionalized verification procedures" (Breitmeier et al 2006:110). Overall, Zürn's results largely support the enforcement school.

## 1.4 Oran Young's analysis

In chapter 4 in Breitmeier et al (2006), Oran Young presents his analyses of the effect of decision rules and compliance mechanisms on regime effectiveness. Young presents two separate analyses – one on decision-making rules and regime effectiveness, and one on compliance mechanisms and regime effectiveness only. The second analysis is considered in this thesis. The dependent construct examined in Young's analyses is regime effectiveness. He includes two independent constructs: "nature of the compliance mechanisms," and "approach to compliance." Nature of the compliance mechanisms refers to what compliance mechanisms a regime uses. Approach to compliance refers to whether a regime relies on a management or an enforcement approach to compliance.

Young finds that capacity building, granting of transition periods to achieve compliance, notices of violation of rules and having no compliance mechanisms have the strongest positive effects on regime effectiveness. His results also support that regimes with a management approach to compliance are more effective than those who choose an enforcement approach to compliance.

Young concludes that "[t]his evidence suggests that there are good reasons for selecting a management approach over an enforcement approach, at least when the problem at hand is environmental in character" (Breitmeier et al 2006:186). He comments only briefly on the results for compliance mechanisms associated with the enforcement school, perhaps because he finds that few regimes use such mechanisms: "Enforcement is simply not a prominent

feature of efforts to promote compliance with international environmental regimes" (Breitmeier et al 2006:189). Overall, the results from Young's analysis largely support the management school, although his finding that having no compliance mechanisms also affects regime effectiveness positively gives support to the social practice perspective.

## 1.5 Research design

In order to answer my research question, I use both qualitative and quantitative methods. In chapters 3, 4 and 5 I use qualitative method, describing the analyses of Young and Zürn and comparing them. In chapter 6 I use quantitative method, more specifically multivariate regression. The research process shows that using only qualitative techniques to answer my research question is insufficient. The qualitative comparison of Young and Zürn's analyses in chapter 5 does not alone provide clear answers to my research question. It merely indicates that the aspects of operationalization, validity and interpretation of results influence the fact that the researchers reach different conclusions. Therefore, to find more specific answers, I do quantitative analyses in addition to the qualitative examination.

I present the analyses of Zürn and Young, respectively, in chapters 3 and 4. To be able to detect what might explain their differing conclusions, a thorough examination of the two analyses is necessary. I identify what data they use, what constructs they study, how they operationalize these constructs, what analytical technique they use, the results they obtain and the conclusions they draw. By presenting the two analyses using the same framework or "checklist," it is easier to identify similarities and differences between them.

In chapter 5, I compare the analyses of Young and Zürn using the same checklist as in chapters 3 and 4. In addition to this checklist, I add considerations about the authors' theoretical approaches, about validity and about the authors' interpretations of results.

I analyze the variables used in Young and Zürn's bivariate analyses in chapter 6 using multivariate regression. I choose multivariate analysis because of the advantages of this technique compared to bivariate statistical techniques. By doing multivariate regression analyses, I aim to (i) explain more of the variance in the dependent variable, (ii) find more robust results by controlling for other independent variables when analyzing one independent variable's effect on a dependent variable, and (iii) find out which independent variables affect which dependent variables and which independent variables have no effects at all.

## 1.6 Plan

Chapter 2 provides an account of the existing theoretical approaches to compliance within the literature on international environmental regimes, as well as a brief presentation of regime effectiveness. Chapter 3 offers an in-depth examination of Zürn's analysis, where the elements of the checklist are identified. Chapter 4 similarly gives an examination of Young's analysis. I compare and discuss the two analyses in Chapter 5 in order to identify differences and possible causes of the differing conclusions. Chapter 6 contains my own statistical analysis of compliance and regime effectiveness using regression to analyze the variables used by Young and Zürn. Finally Chapter 7 provides a summary of the thesis and a presentation of my main findings.

# 2 Theoretical Background

The purpose of this chapter is to introduce the concepts of compliance and regime effectiveness, including the enforcement school and the management school. Stephen Krasner (1982:186) defines international regimes as "sets of implicit or explicit principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations." A regime often consists of agreements, conventions, treaties, protocols and informal understandings among the parties (Breitmeier et al 2006:253, 257). A common structure for an international regime might be a framework convention that is general in character and several underlying protocols dealing with relevant sub-themes. International regimes, both environmental and others, usually come into existence in order to solve or manage a common problem that one state alone is unable to deal with (Breitmeier 2006:254). Examples of such common problems might be transboundary movements of hazardous pollutants or waste and trade in endangered animal and plant species.

Levels of compliance within international environmental regimes should be high in order to achieve the regime's goals and objectives. A country in compliance acts in line with the behavior prescribed by the regime (Breitmeier et al 2006:65). However, scholars have different views on what mechanisms are required to induce a country to comply with regime prescriptions. In short, one group claims that enforcement of compliance may be necessary through the use of penalties and rewards (Downs et al 1996; Barrett and Stavins 2003). The other group opposes this line of thinking and argues in favor of an approach to regime design that values norms and argues in favor of capacity building by the transfer of knowledge, technology and financial resources (Young 1989; Chayes & Chayes 1995). The two schools have been named the enforcement school and the management school, respectively.

In section 2.1, I briefly present considerations about international cooperation and the anarchic character of the international system. In section 2.2, I present the enforcement school and the management school through comparing their views on three issues: (i) why states comply with international agreements, (ii) reasons for noncompliance, and (iii) how to make countries comply. In section 2.3, I provide an account of regime effectiveness. Finally, in section 2.4 I summarize the chapter.

## 2.1 International cooperation in an anarchic world

Anarchy is one of the main characteristics of the international political system. International anarchy has severe implications for the effectiveness of international rules and regulations because lack of overarching authority makes enforcement problematic and ensuring that countries comply with international environmental regimes becomes difficult. This relates to sovereignty – one of the main characteristics of a state. Within a state, the government has coercive powers to enforce compliance with domestic policies (Barrett and Stavins 2003:362). Østerud (2005:39) refers to this type of sovereignty as *internal* sovereignty. In contrast, *external* sovereignty refers to a state's formal independence from other states (or actors). The existence of national sovereignty, consequently, means that enforcement of international agreements cannot be performed by a world government. Instead, all parties participating in an international regime share the responsibility of enforcing the treaties (Barrett and Stavins 2003:362).

## 2.2 The two perspectives – enforcement and management

According to Hovi and Areklett (2003:3), enforcement is a "process of ensuring compliance with some behavioural or outcome standard as laid down in an agreement, a rule, a law, a norm or in some other way." They further divide the term into two different concepts: "hard" and "soft" enforcement. Hard enforcement entails consequences such as financial punishment and suspension of member privileges. Soft enforcement includes capacity building and both technical and economic transfers and supervision (Hovi and Areklett 2003:3-4). However, some claim that it is only the hard enforcement approach that really exhibits enforcement, meaning a regime either has hard enforcement or no enforcement. The soft enforcement approach concerns compliance *facilitation* rather than enforcement of compliance (Hovi and Areklett 2003:4). In the following, the hard enforcement approach represents the views of the enforcement school whereas the soft, facilitative approach reflects the views of the management school. One can identify the differences between these schools by looking at their views on different issues. In the following, I elaborate on the two schools in greater detail by comparing their views on three issues: (i) why states comply with international agreements, (ii) reasons for noncompliance and (iii) how to make countries comply.

### 2.2.1 Why do states comply? Cost/benefit calculus versus norms

An enforcement scholar would argue that when states comply, it is because it is more costly to be noncompliant than to be in compliance with a treaty. In other words, when the country individually benefits from cooperation, it will choose to do so. Additionally, the threat of punitive sanctions if violations occur will deter a country from not complying with an agreement.

Wrong, the management scholar would reply, arguing that countries are not that cynical in their considerations. Rather, states comply with agreements because they follow fundamental norms in international society: "Treaties are to be obeyed" (Chayes and Chayes 1993:185). A majority of the member states comply with international environmental regimes (and other forms of international regulations) most of the time and this is not due to the threat of coercive sanctions. Enforcement is only one of many mechanisms inducing countries to comply with international regulations (Young 1989:71). An enforcement scholar would continue to argue that states' actions are determined by cost/benefit calculations, but management scholars claim to have found empirical evidence supporting their arguments that this is not the case. To confirm their claim, Chayes and Chayes (1993:186) use a quote from rational choice theorist Jon Elster: "I have come to believe that social norms provide an important kind of motivation for action that is irreducible to rationality or indeed to any other form of optimizing mechanism." States will only infrequently willfully defect from their legal obligations (Chayes and Chayes 1993:188).

Downs, Rocke and Barsoom (1996) argue in favor of the enforcement approach, criticizing many of the management school's findings for being incorrect. They argue that many of the findings of management school scholars suffer from serious selection bias, and thus they have wrongly concluded that agreements do not need strong enforcement mechanisms in order to ensure compliance. Downs et al (1996:380) claim that the management school's conclusions result from the fact that most treaties do not possess deep enough commitments and therefore, the member states will only have to make small (possibly insignificant) changes to their behavior, in order to comply with agreements. The need for enforcement is therefore small. However, future international regimes will have to demand deeper commitments from states

in order to cope with such problems as climate change and arms reduction. Downs et al (1996:380) write:

> "… further progress in international regulatory cooperation will almost certainly require the creation of agreements that present far greater incentives to defect than those currently in place (e.g., more demanding environmental standards, fewer nontariff barriers, steeper arms reductions). We have precious little evidence that such progress can be obtained in the absence of better enforcement."

The disappointing results about reducing the emissions of $CO_2$ under the Kyoto Protocol is an example of why deeper commitments demand increased use of hard enforcement. "Enforcement is critical", Barrett (2003:359) writes, and further concludes that deterrence of free-riding together with enforcement of compliance are critical aspects in order for an international environmental agreement to succeed. As opposed to the management school, which assumes that countries in general are positive towards cooperation and cooperate whenever they are able to (Downs et al 1996:380), enforcement scholars believe that cooperation fails more often than not (Barrett 2003:360).

### 2.2.2 Reasons for noncompliance

Why do so many international treaties suffer from low levels of compliance? The enforcement school and management school have different answers to this question. Enforcement scholars pose the same arguments as in the former paragraph: If the costs of complying exceed the costs of not complying, a country will choose not to comply and vice versa. According to the enforcement school, noncompliance occurs when incentives to comply are lacking. Incentives must be in place in order to overcome the problem of free-riding in an agreement.

Management scholars present a more detailed explanation of why countries fail to comply with international agreements. They consider the problem of noncompliance as a problem of capacity and ability rather than a result of deliberate cost/benefit calculations (Chayes and Chayes 1993; Young 1989). Chayes and Chayes (1993) identify three causes of non-compliance: ambiguity, incapacity and a time dimension. First, ambiguity refers to language matters within an agreement or a treaty. Treaties can either be general or detailed in language. A general treaty will be open to many different interpretations, and thus what constitutes compliance will largely be a matter of judgment for each country. This may lead to many different ways of complying. On the other hand, a detailed treaty also has limitations, although one would intuitively think that such a treaty would be more difficult to misinterpret. With a detailed treaty, the problem of "expressing one thing excludes another" becomes

relevant. Also, “precision generates loopholes” (Chayes and Chayes 1993:189). To express the point explicitly: Countries may be non-compliant although they believe themselves to be in compliance. The problem lies in the different interpretations of the written agreement.

Second, incapacity might hinder a country from being in compliance. This point refers to the need for capacity building, one of the bedrocks of the management school. A country can be noncompliant if it lacks the technical or financial resources needed for compliance. Lack of a functioning and competent domestic regulatory system is an important factor for why a country sometimes cannot manage its obligations. Domestic regulatory capacity includes bureaucratic capability, availability of financial resources, and technical and scientific capacity (Chayes and Chayes (1993:193-194). Such challenges must be dealt with by transfers of knowledge, technology and funding to those who lack the capacity to comply with international agreements.

Third, a “temporal dimension”, or insufficient time between the undertaking and implementation of an agreement could cause non-compliance (Chayes and Chayes 1993:195). Time is an important aspect for ensuring that more states will be able to comply with agreements. In order to fulfill obligations demanded by international environmental regimes, changes in social, political and economic national systems are usually necessary, and such changes take time to complete. Therefore, a period of transition might be necessary for some countries – there should be a time lag between the undertaking of an agreement and the countries’ performance (Chayes and Chayes 1993:197).

### 2.2.3 How to make countries comply – incentives versus facilitation

According to the enforcement school, one of the main instruments needed to induce countries to comply with international treaties is *incentives*. Countries need both positive and negative incentives for compliance. In contrast to this view, the management school emphasizes factors such as a country’s reputation within the international community and the importance of standard bureaucratic procedures in order to make compliance a standard decision-making routine.

Supporting the enforcement perspective, Barrett and Stavins (2003:350) start out by explaining the free-riding incentive within international cooperation expressed through nonparticipation and noncompliance. When it comes to collective action problems such as

climate change, countries have to spend vast amounts of resources on reducing their emissions while at the same time having difficulties seeing the country's own benefit of doing so. "Each country can claim for itself only a small fraction of the global benefit of its mitigation efforts, and because marginal abatement costs are increasing, the incentive for countries to mitigate climate change on their own is greatly reduced" (Barrett and Stavins 2003:350). Thus, states need *incentives* to comply with an agreement. This is a core argument within the enforcement school.

Barrett and Stavins (2003:360-366) identify both positive and negative incentives for participation and compliance. Incentives are needed to overcome the problem of free-riding in international affairs (Barrett and Stavins 2003:350).

Examples of positive incentives include side payments, issue linkages and emissions trading. A side payment is a money transfer to a party from one or more of the other parties in the agreement (Barrett and Stavins 2003:360). The idea is to even out the gains from cooperation between the parties by having the ones who gain a lot from an agreement compensate those who gain less or even lose from being part of an agreement. The second type of positive incentive is issue linkage. Cooperation in one area can be combined with cooperation in another and thereby increase a state's interest in cooperating. This way ensures more parties gain from an agreement (Barrett and Stavins 2003:360). The third positive incentive mechanism includes the possibility for parties to trade internationally in emission entitlements. The way this works is that the countries that easily cut their emissions can sell emission quotas to other countries that find it more costly and difficult to cut their emissions. This is, of course, only possible if there is a set, total emission cap. Then, for the issue of climate change, it is irrelevant *who* makes the additional emission reductions as long as the total of emissions does not exceed the cap. However, this is far from irrelevant to the countries because of the costs connected with reducing emissions. This kind of trading promotes cooperation because the buyer of quotas is allowed to save costs and the seller is allowed to earn revenues (Barrett and Stavins 2003:360).

In some cases positive incentives might be sufficient to induce countries to comply. But in most cases, enforcement scholars would argue, negative incentives are also required in order for all countries to be in compliance. Three such mechanisms are identified by Barrett and Stavins (2003:362): reciprocal measures, financial penalties and trade restrictions. Reciprocal measures refer to measures that involve punishment of the violating party, by the other parties

– a “tit-for-tat” situation. “If you pollute, I (or we) will pollute, too”. The threat that others will pollute in retaliation to a party’s violation might deter the member state from violating the agreement. However, this is not a plausible measure to use, because if the punishment is carried out, not only the violator but the whole natural environment will suffer because total mitigation is reduced (Barrett and Stavins 2003:363). Financial penalties represent the second negative incentive. This merely implies that member states will be punished financially if they do not comply with an agreement. A problem with such sanctions, however, is that they lack credibility because there is no international authority to enforce them (Barrett and Stavins 2003:370). The third type of negative incentive is trade restrictions, for instance in the form of a $CO_2$ tax on certain goods (Barrett and Stavins 2003:364). One problem with this, however, is that it is difficult to determine the amount of carbon dioxide it has taken to produce a good or the total amount of carbon dioxide the good itself will create: “… it would be virtually impossible in practice to calculate the carbon emitted in the manufacture and distribution of each and every good” (Barrett and Stavins 2003:365). Barrett and Stavins (2003: 370) argue that the threat of trade restrictions would not be credible: “Virtually all trade goods result in greenhouse gas emissions (during their manufacture, if not their use), and restricting trade in all goods and services is simply not credible.”

Young (1989:71) claims that enforcement represents only one of many mechanisms inducing compliance. Presenting views related to those of the management school, he argues that the two most important bases for compliance include “decision variables” and “collective-choice considerations” (Young 1989:72). “Decision variables” are considerations that take part in the calculus of a unitary actor making a decision. One of the arguments within the decision variables category is the importance of trust within international society: “A reputation of trustworthiness is one of the most valuable assets that any member of international society can acquire” (Young 1989:75). Complying with international rules and regulations is a way for a country to increase its respect among other members of international society. The other category, collective-choice considerations, focuses on the internal decision-making processes within states and their influence on compliance with international regimes. This includes bureaucratic “tugs-of war” and pressures from non-governmental organizations (NGOs). Creating standard operating procedures within and between the government and NGOs is a means of ensuring compliance with regimes. This way compliance largely becomes “routine practice” (Young 1989:77-79).

In conclusion, the absence of an independent authority enforcing international agreements does not imply that countries automatically will defect from an agreement as soon as it conflicts with their interests (Young 1989:79). There are several other bases for compliance within the international system than simply incentives and sanctions.

## 2.3 Regime effectiveness

Underdal (2002:4) provides what he calls a "common sense" definition of regime effectiveness: "… a regime can be considered effective to the extent that it successfully performs a certain (set of) function(s) or solves the problem(s) that motivated its establishment." The concept of regime effectiveness is much broader and complex than compliance because it not only encompasses the member states' behavior but also the regime's performance in relation to its stated goals and with regard to actual changes in the natural environment. Underdal (2002:5-7) suggests dividing the concept into three separate parts in order to make the evaluation of effectiveness more feasible. In other words, he operationalizes regime effectiveness by looking at three different practically measurable aspects: Output – the formal norms, rules, principles and guidelines resulting from a regime negotiation process (decision making and regime formation), outcome – the changes in human behavior caused by the regime, and impact – the changes in the biophysical environment caused by the regime.

| **Object** | *Output* ⟶ (regime formation) | *Outcome* ⟶ (regime implementation) | *Impact* |
|---|---|---|---|
| **Time** | Level 1: The international agreement is signed.<br><br>Level 2: Domestic measures are taken. | Measures are in effect, and target groups adjust | Nature responds to changes in human behavior |

Figure 2.1 (Underdal 2002:7)

Helm and Sprinz (1999; 2000) have developed a model for measuring regime effectiveness called the Oslo-Potsdam solution (Hovi, Sprinz and Underdal 2003:74). In this model, the regime's actual performance (AP) is measured against two baselines: the no-regime counterfactual (NR; the hypothetical situation of the non-existence of the regime) and the collective optimum (CO; the "ideal" solution) (Helm and Sprinz 2000:636, 637). The formula for regime effectiveness (E) is:

$$E = \frac{AP-NR}{CO-NR}$$

The distance between the no-regime counterfactual (NR) and the collective optimum (CO) represents a regime's potential. The actual performance (AP) of the regime will likely be somewhere in-between NR and CO (Helm and Sprinz 2000:636). "The effectiveness of a regime (E) can then be measured as the relative distance that the actual performance has moved from the no-regime counterfactual toward the collective optimum or as the percentage of the regime potential that has been achieved" (Helm and Sprinz 2000:636). The effectiveness "score" varies between 0 and 1 where 0 represents no effectiveness and 1 represents perfect regime effectiveness (Helm and Sprinz 2000:636).

## 2.4 Summary

Because of the anarchic character of the international political system and the sovereignty of states, enforcing international cooperation becomes difficult. Scholars disagree about the need for enforcement. Enforcement scholars emphasize so-called "hard" enforcement whereas management scholars promote facilitation of compliance, or "soft" enforcement. The two perspectives have diverging views on at least three issue areas: Why states cooperate, the reasons for noncompliance and what is required to make countries comply with international agreements. Where enforcement scholars argue in favor of positive and negative incentives like side payments and financial penalties, management scholars view capacity building, transfers of knowledge and financial resources as keys to helping countries comply with international environmental agreements.

Regime effectiveness is a complex concept which can be measured in several different ways. In this chapter, two possible ways of measuring regime effectiveness has been presented: Underdal's (2002:7) "output-outcome-impact" model and Helm and Sprinz' (1999;2000) Oslo-Potsdam solution.

# 3 Michael Zürn's Analysis

The purpose of this chapter is to present the analyses of Michael Zürn about the effect of horizontal compliance mechanisms on compliance levels. Chapter 4 is a similar presentation of Oran Young's research design. By identifying aspects such as the data and constructs used, operationalization and analytical technique, I can more easily compare the two analyses and identify differences that may have caused Young and Zürn's differing conclusions. In section 3.1, I present information about the data. In section 3.2, I provide information about the constructs. Section 3.3 includes Zürn's operationalization and variables. In section 3.4, I provide an account of the analytical technique. In section 3.5, I present Zürn's results, and section 3.6 includes his conclusions. Section 3.7 is a brief summary of the chapter.

## 3.1 Data

Both Young and Zürn have used data from the International Regimes Database (IRD) when conducting their analyses. The IRD is a database developed by the three authors of "Analyzing International Environmental Regimes – From Case Study to Database" (2006), Helmut Breitmeier, Oran Young and Michael Zürn. It contains information about 23 international environmental regimes[3]. The information provided in the database is divided into four main sections: regime formation, regime attributes, regime consequences, and regime dynamics. The units of analysis were originally thought to be regimes, but since regimes often consist of several different components such as treaties, conventions, annexes and protocols, which change over time, this proved difficult during trial runs of the data base (Breitmeier et al 2006:34). The units of analysis are so-called "regime elements." Regime elements are separate components of a regime (treaty, convention, annex, protocol) but also include changes within a regime over time. Breitmeier et al (2006:43) write: "... it became apparent that individual regime components often experience major changes over time." Therefore, the regime components have been divided into separate regime elements if major

[3] Antarctic Regime, Baltic Sea Regime, Barents Sea Fisheries Regime, Biodiversity Regime, CITES Regime (Trade in Endangered Species), Climate Change Regime, Danuber River Protection Regime, Desertification Regime, Great Lakes Management, Hazardous Waste Regime (Basel Convention), IATTC-Regime (Inter-American Tropical Tuna Convention), ICCAT-Regime (Conservation of Atlantic Tunas), Regime for the International Regulation of Whaling, London Convention Regime, ECE-Regime on Long-Range Transboundary Air Pollution, North Sea Regime, Oil Pollution Regime, Regime for the Protection of the Rhine against Pollution, Ramsar Regime on Wetlands, Regime for Protection of the Black Sea, South Pacific Fisheries Forum Agency Regime, Stratospheric Ozone Regime, Tropical Timber Trade Regime.

temporal changes occurred. There are three types of major, or "watershed," changes: when there are major changes in the key principles and norms of a regime component, when there are changes in the group of leading participating actors (i.e. when two large, influential actors like China and India joined the ozone regime in the beginning of the 1990s), and when a regime deepens its functional scope, for example, through adding substantive protocols to a framework agreement (Breitmeier et al 2006:43) (i.e. the addition of the Kyoto Protocol to the UNFCCC). 172 regime elements represent the units of analysis in the IRD.

## 3.2 Constructs

### 3.2.1 Dependent construct – compliance

The dependent construct in Michael Zürn's analysis is compliance. He defines compliance by using Oran Young's (in Breitmeier et al 2006:65) definition: "compliance can be said to occur when the actual behavior of a given subject conforms to prescribed behavior, and non-compliance or violation occurs when actual behavior departs significantly from prescribed behavior." It is important to note that compliance refers to the actions and behavior of the parties to an agreement, and not to their attitudes and motives (Breitmeier et al 2006:65). Furthermore, compliance must be distinguished from both implementation and effectiveness (Breitmeier et al 2006:64): Regime implementation concerns questions regarding how a regime's legislative requirements look on paper compared to how they are implemented in practice (Breitmeier et al 2006:65). Regime effectiveness refers to a situation where a regime successfully fulfills a certain set of functions or solves the problems it was created to solve (Underdal 2002:4).

Zürn emphasizes that non-compliance does not necessarily reflect the unwillingness of actors to comply. Violation of a rule can often be the consequence of rule ambiguity (Breitmeier et al 2006:65). Here, the author argues in line with similar arguments from management school scholars such as Chayes and Chayes (1993). He particularly mentions the problem of rule ambiguity – an argument promoted by the management school – in relation to non-compliance. The ambiguity of a rule makes it more difficult to evaluate objectively whether compliance is taking place or not. Zürn terms the issue of treatment of accusations of noncompliance the *procedural* dimension of compliance. However, in his analysis, the

*substantive* dimension of compliance – "the relationship between obligations and actual behavior" – represents the dependent construct (Breitmeier et al 2006:66).

## 3.2.2 Independent constructs

Zürn identifies four different independent constructs, which he expects to influence compliance: incentives, legalization, legitimacy and responsiveness. The author makes it clear that these variables cannot alone make up a comprehensive theory about compliance, but each provides valuable insight into how one can cope with compliance problems (Breitmeier 2006:72).

### Incentives

The construct "incentives" comprise the use of positive and negative sanctions to induce countries to comply with an agreement. It targets countries that "cheat" because the net benefit of complying is smaller than the benefit of not complying. The theory assumes that actors are unitary and will comply only if the benefits of complying with an agreement exceed the costs. In this case, costs and benefits are not limited to money, but also include non-economic factors like power and prestige (Breitmeier 2006:72,73). Positive and negative incentives ought to be designed in such a way as to prevent cheating and free riding by the participants. Both positive and negative incentives will influence the actors' cost-benefit considerations. Some regimes entail more threats and punishments than others to ensure the credibility of the rules of the regime. However, in general, all rules and regulations that may trigger cheating need to be supported by credible threats of punishment in the case of noncompliance. There are at least two requirements that should be in place to detect cheating and punish the violators. First, verification procedures of regime implementation need to be feasible, reliable and affordable. Second, the sanctioning of violators should not be too costly for those imposing the sanctions (Breitmeier et al 2006:73, 74). Another crucial condition for sanctioning to be effective is that it must be costly for the country being sanctioned. If not, it will not change its behavior (Hovi 1998:14). Put simply, sanctioning must be cheap for the ones imposing the sanctions and costly for those being sanctioned. Only then can a sanction prove effective and change the behavior of the violator.

Hypothesis 1: Incentives improve compliance rates.

## Legalization

The second independent construct in Zürn's analysis is "legalization". This perspective targets two sources of noncompliance, namely inconsistencies in rule development and application and the abuse of ambiguities of a rule. "Legalization" is composed of two aspects: internalization and juridification. The first aspect, internalization, originates in international law and means that internalization of international laws into national legal systems may lead to the international rule or norm receiving full legal status in a country (Breitmeier et al 2006:82). "It follows that the more a rule is integral to a legal system or, in other words, the more an international institution is legalized, the more likely compliance becomes" (Breitmeier et al 2006:79). In the United States, for instance, a ratified treaty automatically becomes domestic law when it enters into force if it is "self-executing". A self-executing treaty is one that does not need enabling (implementing) legislation. For treaties that do require enabling legislation, the enabling legislation (not the original treaty unless incorporated into the legislation) becomes domestic law upon its enactment (Bang, Hovi og Sprinz, forthcoming:8).

The second aspect of legalization is juridification. Juridification includes processes that ensure clarity, pertinence, stringency, adaptability and consistency (both within the rule itself and in relation to other rules) when rules and regulations are designed. This aspect represents a possible solution to the problem with rule ambiguity and especially to the problem that states abuse rule ambiguity to sneak away from their obligations. In practical terms, juridification means the "delegation of … power to develop and interpret rules to bodies possessing some degree of autonomy" (Breitmeier et al 2006:83). Such bodies are often supranational or transnational courts or other dispute-settlement bodies (Breitmeier et al 2006:83).

Hypothesis 2: Legalization, including both juridification and internalization, improves compliance rates.

## Legitimacy

The third independent construct in which Zürn expects influence compliance, is "legitimacy." The core of this perspective is the subjective validity of a rule to a country. The degree of justice and fairness in the rule-making process and application of rules determines whether a

country considers a rule legitimate (Breitmeier et al 2006:91). Fair decision making is key to enhancing legitimacy. A decision-making process in which actors are actively engaged and where they feel that no decisions are biased in favor of any particular actors or special interests consequently produces the most legitimate rule. The theory predicts that enhancing the legitimacy of a rule both at the international and at the national level makes compliance more likely.

Hypothesis 3: Legitimacy improves compliance rates.

#### Responsiveness

The fourth independent construct presented in the chapter is "responsiveness." This mechanism is a response to "open but involuntary violations … when *rules turn out to be impractical*" [emphasis original] (Breitmeier et al 2006:71). Responsiveness means the adjustment of rules if they prove to be impractical to comply with. This has nothing to do with the interpretation of a rule nor with its validity. Rather, it has to do with practical issues making it difficult for parties to fulfill their obligations (Breitmeier et al 2006:71,72). A regime exercising responsiveness is a flexible regime that adapts and adjusts its rules when unintentional noncompliance is observed (Breitmeier et al 2006:105).

Hypothesis 4: Responsiveness to problems of implementation improves compliance rates.

## 3.3 Operationalization

### 3.3.1 Compliance – operational definition

Variable RC 5: "Does the behavior of important actors generally conform to the provisions of the regime? Did the regime exert a causal influence on these developments?" is the operational variable measuring compliance in Zürn's analysis. A country conforms to the provisions of the regime if it meets the prescribed requirements of the regime regardless of how this is done and what caused the compliant behavior. Furthermore, if a country is expected to behave in the same manner regardless of the existence of the regime, the regime has no causal impact. If a regime does have causal impact on actors' behavior, this influence may be of a positive or negative character.

The first part of variable RC 5 provides seven different answering options:

0 – Not applicable.

1 – Behavior exceeds regime requirements.

2 – Behavior meets regime requirements.

3 – Behavior conforms with some requirements but not all.

4 – Behavior conforms some (but not all) of the time and/or to some degree but not completely.

5 – Behavior does not conform at all.

6 – Don’t know.

For the second part of the variable, regarding the causal influence of the regime, six answering options are provided:

0 – Not applicable.

1 – Little or no causal impact.

2 – Modest causal influence.

3 – Large causal influence.

4 – Negative causal influence.

5 – Don’t know.

## 3.3.2 Independent variables – operational definitions

### Incentives

To measure the construct "incentives," Zürn uses three operational variables. The first concerns the regime's compliance mechanisms while the other two concern the regimes' verification procedures.

RA 47: "What formal compliance mechanisms are provided for in the regime's constitutive provisions to achieve compliance?" There are 12 different answering options, including:

0 – Not applicable.

1 – No compliance mechanisms.

2 – Issuance of notices of violations.

3 – Suspension of membership rights.

4 – Exclusion from membership.

5 – Imposition of military punishments.

6 – Imposition of financial/economic punishments.

7 – Support for capacity building to enhance compliance.

8 – Granting of a transition period to achieve compliance.

9 – Dissolution of linkages.

10 – Identify additional compliance mechanisms, if applicable.

11 – Don't know.

Alternatives 3-6 are compliance mechanisms typically associated with the enforcement school, whereas alternatives 2 and 7-9 often are associated with the management school.

To measure the effect of verification procedures, Zürn uses variable RA 45: "Are there reporting procedures requiring the submission of information by individual members pertaining to regime implementation?" Respondents could choose between the following alternatives:

0 – Not applicable.

1 – No.

2 – Yes.

3 – Don’t know.

The second variable measuring verification procedures is RA 46: “Are there procedures for reviewing implementation formally or not formally established in the regime’s constitutive provisions?” Answering options include:

0 – Not applicable.

1 – There are no explicit review procedures.

2 – Information gathering for broad assessment without evaluating performance/compliance of individual parties.

3 – Information from third parties on implementation by other parties.

4 – Information gathering for assessment of performance and compliance of individual parties.

5 – Review and broad assessment of the regime by the supreme decision-making body.

6 – Review and broad assessment of the regime by bodies delegated by parties to make decisions or recommendations.

7 – Review of member performance/compliance by the supreme decision-making body.

8 – Review of member performance/compliance by bodies delegated by parties to make decisions or recommendations.

9 – Recommendation/implementation of responses to inadequate performance by the supreme decision-making body.

10 – Recommendation/implementation of responses to inadequate performance by bodies delegated by parties.

11 – On-site inspections to verify compliance.

12 – Identify additional review procedures, if applicable.

13 – Don't know.

### Legalization

The concept of legalization refers to both internalization and juridification. Zürn explains that there are few directly relevant variables available in the data set to measure internalization (Breitmeier et al 2006:83). However, one variable with indirect relevance for internalization is variable RA 11: "Are the regime's substantive rules legally binding on the members, or do they have the character of soft law (e.g., ministerial declarations, codes of conduct)?"

0 – Not applicable.

1 – Rule is legally binding.

2 – Rule is soft law/not legally binding.

3 – Don't know.

To measure the other component of legalization, juridification, Zürn uses variable RA 29: "Did the members of the regime establish a secretariat for the regime as a whole or any of its elements?" Possible responses are:

0 – Not applicable.

1 – No secretariat established.

2 – Regime has a secretariat of its own operating independently of other organizations.

3 – An intergovernmental organization performs the secretariat's functions.

4 – A nongovernmental organization performs the secretariat's functions.

5 – A nation state performs the secretariat's functions.

6 – Don't know.

Variable RA 30 is also used to measure juridification: “How independent is the secretariat from the regime’s members?” The answering alternatives are:

0 – Not applicable (no secretariat exists).

1 – Highly independent: The secretariat has broad latitude to take action independent of member approval. Most of the important actions do not need state approval.

2 – Strong independence: Between 1 and 3 on the scale.

3 – Some independence: The secretariat has some latitude to take action with regard to some, but not all, important issues.

4 – Less independent: Between 3 and 5 on the scale.

5 – No independence: The secretariat has no latitude to take independent action. All action taken by the secretariat must have state approval.

6 – Don’t know.

Zürn also examines the effect of having autonomous decision-making bodies on compliance (Breitmeier et al 2006:87), using variable RA 33: “What decision-making bodies are provided for in the regime?”. Answering options include:

0 – Not applicable.

1 – Regular meeting of conference of the parties.

2 – Ad hoc meetings of conference of the parties.

3 – Standing subsidiary body.

4 – Ad hoc subsidiary body.

5 – Don’t know.

The final variable measuring juridification is RA 12 “Are the regime’s substantive rules generally precise and easy to interpret in the sense that they call for well-defined actions, or are they ambiguous and indeterminate?”

0 – Not applicable.

1 – Precise and easy to interpret.

2 – Between 1 and 3 on the scale.

3 – Medium.

4 – Between 3 and 5 on the scale.

5 – Ambiguous and indeterminate.

6 – Don’t know.

### Legitimacy

Within the theoretical explanation of the variable “legitimacy,” the aspect of inclusion of member states in the decision-making process is captured by variable RF 46: “Were there states not participating in the negotiation process that other actors believed should have participated?” with possible answering options:

0 – Not applicable.

1 – No.

2 – Yes.

3 – Don’t know.

Also covering the aspect of justice by including relevant parties in the negotiations is question RF 49: “What roles did non-state actors play in the negotiations?” including the answering options:

0 – Not applicable.

1 – Observer role.

2 – Member of national delegation.

3 – Member of negotiation body.

4 – Exerted pressure inside the negotiations.

5 – Exerted pressure outside the negotiations.

6 – Don’t know.

The third variable measuring legitimacy is variable RF 19: “Were the nations involved in regime formation roughly symmetrical in terms of issue-specific power or did the process involve sharp differences in power resources?”

0 – Not applicable.

1 – Completely even distribution.

2 – Slightly uneven distribution.

3 – Considerable unevenness.

4 – Highly uneven distribution.

5 – Issue-specific hegemon present.

### Responsiveness

With regard to the variable “responsiveness,” i.e. how flexible the regime is in responding and adjusting to unintentional noncompliance, Zürn chooses variable RA 13: “Does the regime have substantive rules that differentiate among its members in terms of requirements, prohibitions, or permissions?” Answering alternatives include:

0 – Not applicable.

1 – Rule does not differentiate among members.

2 – Rule differentiates among members.

3 – Don’t know.

To measure the responsiveness aspect, variable RA 47, which asks what compliance mechanisms a regime entails, is used again (the variable was also used for "incentives"). The most interesting values on this variable, according to Zürn's theoretical expectations about responsiveness, are "7 – support for capacity building to enhance compliance" and "8 – granting a transition period to achieve compliance."

## 3.4 Analytical technique

According to the information and tables provided in the chapter, Zürn performs bivariate cross-table analyses. This means that the researcher examines each independent variable's influence on the dependent variable, one at a time, without controlling for other independent variables.

## 3.5 Summary of results

The independent construct "incentives" influences compliance positively according to Zürn's results. Incentives have the strongest effect on compliance when the following compliance mechanisms are present: suspension of membership rights, exclusion from membership, imposition of military punishments and imposition of financial and economic punishments (Breitmeier et al 2006:78). These are all negative incentives. Zürn's analysis shows that the use of negative incentives increases compliance levels. It also shows that regimes with such negative incentive mechanisms play a causal role in promoting compliance (Breitmeier et al 2006:78).

Zürn's results also show that the use of procedures for implementation reporting influences compliance positively. The third operational variable measuring incentives, procedures for reviewing implementation, reveals that only strong verification procedures for reviewing implementation have a positive effect on compliance levels. The categories 10 – recommendation/implementation of responses to inadequate performance by bodies delegated by parties and 11 – on-site inspections to verify compliance, have the strongest positive effect on compliance levels (Breitmeier et al 2006:78).

The second variable, "legalization," is divided into two components: internalization and juridification. Zürn finds that the variable measuring the concept of internalization has no effect on compliance rates (Breitmeier et al 2006:91). The results from Zürn's analyses

further show that juridification improves compliance rates, but this effect is not strong. The variables concerning the existence of a secretariat and the independence of the secretariat have only unimportant effects on compliance. The effect of a standing autonomous decision-making body is positive, but fairly weak, and so is the effect of precise rules. Overall, regimes with standing decision-making bodies and precise rules have somewhat higher compliance rates than those with ad-hoc decision-making bodies and low rule precision, and the results support Zürn's theoretical expectations about juridification (Breitmeier et al 2006:90).

The third independent variable, "legitimacy", concerns the subjective validity of a rule to a country. The statistical results show that absence of important actors in these processes negatively affects compliance. The probability of high compliance rates increases when all important actors participate in the decision making and rule application. The inclusion of non-state actors in national delegations or in negotiating bodies increases compliance rates (Breitmeier et al 2006:103, 104). In other words, compliance improves when all affected actors are involved in rule making. Both of these results support Zürn's hypotheses.

The fourth and final independent variable, "responsiveness," does not influence compliance as prescribed by the theory. Compliance levels *decrease* when the regime differentiates between actors in terms of requirements, prohibitions and permissions. Zürn also finds that capacity building and granting of transition periods negatively affects compliance (Breitmeier et al 2006:105).

## 3.6 Zürn's conclusions

Zürn concludes that there is a clear need for sanctioning and strong, institutionalized verification procedures, in order to induce compliance. "… efforts to promote compliance through negotiations and various forms of capacity building are not sufficient to induce compliance with international rules and regulations" (Breitmeier et al 2006:110). The results of his analyses show that regimes with sanctioning mechanisms (negative incentives) and strong verification procedures for implementation have higher compliance levels. Zürn suggests a more comprehensive view on compliance, including incentives, institutional design, the rule of law and the power of legitimacy (Breitmeier et al 2006:110).

## 3.7 Summary

In this chapter, I have presented Michael Zürn's analysis of horizontal compliance mechanisms and compliance. More specifically, I have provided information about the data in Zürn's analysis, the constructs and variables, the analytical technique, the results, and his conclusions. In the next chapter I present Young's analysis in a similar manner.

# 4 Oran Young's Analysis

In this chapter I present Oran Young's analysis of the effect of compliance mechanisms on regime effectiveness. An account of this is a necessary to identify differences Young and Zürn's analyses, in order to answer the question of why they reach differing conclusions. In section 4.1, I present information about the data. In section 4.2 I provide information about the constructs. Section 4.3 includes Young's operationalization and variables. In section 4.4 I provide an account of the analytical technique. In section 4.5, I present Young's results, and section 4.6 includes his conclusions. Section 4.7 is a brief summary of the chapter.

## 4.1 Data

Young uses the same database as Michael Zürn, the International Regimes Database (IRD) in his analyses.

## 4.2 Constructs

### 4.2.1 Dependent construct – regime effectiveness

In Young's chapter, there is not much information about the theoretical construct of regime effectiveness. Rather, Young focuses largely on the operational definition of the construct. In his analyses regime effectiveness is treated "both as the attainment of goals and as progress toward solving the problems leading to [the regimes'] … creation" (Breitmeier et al 2006:114). He specifies that goal attainment on its own is not a sufficient indicator of regime effectiveness. Goals can be quite modest, and can be fulfilled without it having any effect on the underlying problem. Problem solving is a necessary complementary indicator of regime effectiveness, therefore (Breitmeier et al 2006:131).

### 4.2.2 Independent constructs

Young uses two independent constructs in his analyses: the nature of the compliance mechanisms (what compliance mechanisms a regime occupies), and the theoretical approach to compliance (management or enforcement). He then presents four different variable combinations, or queries (Breitmeier et al 2006:157):

1. Are there clearcut links between the nature of the compliance mechanisms provided and goal attainment?

2. Are there discernible patterns in the connections between the nature of the compliance mechanisms provided and problem change?

3. Are there connections between the approach to compliance chosen and goal attainment?

4. Are there links between the approach to compliance chosen and problem change?

In these queries, the expected findings are not explicit. Young does not specify what he expects to find, but rather states what proponents of the different theoretical schools will expect to find with regard to "the success of the … regimes" (Breitmeier et al 2006:156). Based on these schools' expectations, I formulate six concrete hypotheses:

1. Mechanisms capable of generating rewards and penalties improve compliance rates.

2. Mechanisms capable of generating rewards and penalties improve regime effectiveness.

3. Operation of compliance mechanisms, but not necessarily the use of penalties and rewards, increases compliance rates.

4. Operation of compliance mechanisms, but not necessarily the use of penalties and rewards, improves regime effectiveness.

5. There is no clearcut relationship between compliance mechanisms and compliance rates.

6. There is no clearcut relationship between compliance mechanisms and regime effectiveness.

## 4.3 Operationalization

### 4.3.1 Dependent variables – goal attainment and problem change

To measure "regime effectiveness", Young has chosen two operational variables: goal attainment and problem change. The first variable is goal attainment: Variable RC 10: "If the

regime has stated goals, indicate whether the behavioral changes led to the fulfillment of the stated goals of the regime." Answering alternatives include:

0 – Not applicable (No goals).

1 – No (Goals not fulfilled).

2 – Yes (Goals fulfilled).

3 – Don't know.

The follow-up question is: "For each stated goal coded under GOALS_FULFILL, indicate what causal impact the regime had on this development":

0 – Not applicable.

1 – Little or no causal impact.

2 – Modest causal influence.

3 – Large causal influence.

4 – Negative causal influence.

5 – Don't know.

The second variable measuring the construct of regime effectiveness is problem change: Variable RC 11 "For each problem listed under PROBLEM, indicate whether and how the state of the world changed during this period with respect to the problem". Possible answering options are:

0 – Not applicable.

1 – The problem worsened considerably.

2 – The problem worsened slightly.

3 – The problem stayed the same.

4 – The problem improved slightly.

5 – The problem improved considerably.

6 – Don’t know.

Following this question as well is a follow-up question regarding the causality of the regime: For each problem coded under PROBLEM_CHANGE indicate whether the regime exerted a causal influence on the change of the world with regard to the problem”:

0 – Not applicable.

1 – Little or no causal impact.

2 – Modest causal influence.

3 – Balanced causal influence.

4 – Significant causal influence.

5 – Very strong causal influence.

6 – Don’t know.

### 4.3.2 Independent variables – operational definitions

To measure the independent construct “nature of compliance mechanisms”, Young uses variable RA 47: “What formal compliance mechanisms are provided for in the regime’s constitutive provisions to achieve compliance?” (Breitmeier et al 2006:156). Both Zürn and Young include this variable in their analyses. There are twelve different answering options, including four compliance mechanisms which are usually linked to the enforcement school (3-6), and four mechanisms typically associated with the management school (2 and 7-9).

0 – Not applicable.

1 – No compliance mechanisms.

2 – Issuance of notices of violations.

3 – Suspension of membership rights.

4 – Exclusion from membership.

5 – Imposition of military punishments.

6 – Imposition of financial/economic punishments.

7 – Support for capacity building to enhance compliance.

8 – Granting of a transition period to achieve compliance.

9 – Dissolution of linkages.

10 – Identify additional compliance mechanisms, if applicable.

11 – Don't know.

The second independent construct, "theoretical approach to compliance", is operationalized by variable RA 49: "Do these [compliance] procedures generally reflect an enforcement approach or a management approach to compliance?" (Breitmeier et al 2006:157). Answering options include:

0 – Not applicable.

1 – Enforcement approach.

2 – Management approach.

3 – Don't know.

## 4.4 Analytical technique

Young uses bivariate cross-table analysis in his research. This is the same technique as Michael Zürn uses in his analysis.

## 4.5 Summary of results

Young finds that the compliance mechanisms "capacity building" and "notices of violation" have the greatest positive effect on goal attainment. More specifically, "goal attainment occurred in 89.2 percent of the cases featuring capacity building" (Breitmeier et al 2006:158). In the cases where the use of capacity building led to goal attainment, the regime had a large

causal impact on this in 83.6 percent of the cases, according to Young's results. Almost exactly the same numbers also count for the value "issuance of notices of violation" (90.8 and 81.1 percent, respectively) (Breitmeier et al 2006:158, 161). Overall, Young finds that compliance mechanisms associated with the management school have the strongest positive effect on goal attainment.

The results for the relationship between compliance mechanisms and the other dependent variable, problem change, are similar to the ones presented for goal attainment. Here, Young finds that having no compliance mechanisms actually leads to considerable improvement in the problem in 20.6 percent of the cases (Breitmeier et al 2006:159). But according to his results, no compliance mechanisms actually lead to a worsening of the problem in 23.3 percent of the cases (Breitmeier et al 2006:164). The compliance mechanisms "issuance of notices of violation" and "capacity building" again prove to have strong positive effects on problem change. Capacity building has the strongest effect: In those regimes with capacity building mechanisms, there was slight improvement in the problem in 43.9 percent of the cases, and considerable improvement in the problem in 22 percent of the cases (Breitmeier et al 2006:182).

A univariate analysis of the independent variable concerning approach to compliance reveals that in 94.1 percent of the cases, the management school is dominant. Based on this, Young states that: "Those who create and administer international regimes exhibit an overwhelming preference for procedures featuring management in contrast to enforcement" (Breitmeier et al 2006:186). His results for the analysis of "approach to compliance" on goal attainment show that 86.1 of the regimes that associate themselves with the management school attain their goals. Out of the regimes that associate themselves with the enforcement school (5.94 percent), 54.17 percent attain their goals. In both instances, the causal influence of the regime is strong (Breitmeier et al 2006:186).

The results from the analysis of the effect of "approach to compliance" on problem change show that 26.9 percent of the regimes associated with the management school (89.4 percent) have experienced considerable improvement in the problem. The regime had a very strong causal impact on this improvement in just over 15 percent of the cases. 33.33 percent of the regimes associated with the enforcement school (10.57 percent) noted a considerable improvement in the problem. The regime did not have a strong causal influence on this

improvement, but a significant causal role in 60 percent of the cases (Breitmeier et al 2006:186).

## 4.6 Young's conclusions

Young concludes that international environmental regimes can make a difference regardless of coercive capacity: "Overall, the data from the IRD suggest that regimes can make a difference, even when they lack the coercive capacity we often assume is needed to produce effective governance" (Breitmeier et al 2006:186). He concludes that "the evidence we have presented in this chapter suggests that there is no reason to dismiss international regimes because of their … tendency to avoid familiar enforcement mechanisms" (Breitmeier et al 2006:190).

## 4.7 Summary

In this chapter, I have presented information about data, constructs and variables, analytical technique, results, and conclusions from Young's analyses of regime effectiveness. In the next chapter, I compare Young and Zürn's analyses.

# 5 Comparison of the two analyses

Why do Michael Zürn and Oran Young reach different conclusions with regard to the relationship between enforcement and compliance? To answer this question, a thorough comparison of the two analyses is necessary. In this chapter, I identify similarities and differences between Young and Zürn's analyses in order to explain their different conclusions. In section 5.1, I provide an account of the two dimensions on which the analyses are identical: Data and analytical technique. In section 5.2, I present the dimensions on which the analyses differ: Dependent construct, independent constructs, operationalization, theoretical approaches, research question, validity and interpretations of results. These dimensions are the ones of greatest interest in order to answer my research question. In section 5.3 I summarize my findings.

## 5.1 Similarities

The analyses of Young and Zürn are identical on two accounts: Data and analytical technique. This could, in theory, lead to similar research results, but only if the researchers also choose at least some of the same variables from the dataset.

### 5.1.1 Data

Young and Zürn use the same empirical data, the IRD, in their analyses. This implies that their choice of units of analysis, or regime components, cannot explain that their conclusions differ.

### 5.1.2 Analytical technique

Both Young and Zürn use bivariate crosstable analysis to examine the data from the IRD. On this dimension, their analyses are identical. Differences in analytical technique, therefore, cannot explain the different conclusions.

## 5.2 Differences

Dependent construct, independent constructs, operationalization, theoretical approach, research question, questions concerning validity and interpretation of results differ between

Young and Zürn's analyses. Some of these aspects, therefore, are likely the cause of the differing conclusions.

### 5.2.1 Dependent construct

The dependent construct in Zürn's analysis is compliance while the dependent construct in Young's analysis is regime effectiveness. These are two different constructs. Compliance occurs when subjects to an agreement act in accordance with the behavior prescribed by the regime (Breitmeier et al 2006:65). Regime effectiveness, according to Underdal (2002:4), describes a situation where a regime successfully performs the functions it was created to perform and/or solves the problems it was created to solve. The two constructs are, however, closely linked, since compliance is a necessary component of regime effectiveness. In order for a regime to be effective, high compliance rates are necessary, but not sufficient. Broad participation and deep commitments are the other two components necessary for a regime to be effective, according to Barrett (2008:242, 243).

### 5.2.2 Independent constructs

Zürn's analyses include four different independent constructs which he expects to influence compliance: "Incentives," "legalization," "legitimacy" and "responsiveness."

To explain the variance in the dependent constructs of goal attainment and problem change, Young uses two independent constructs: the nature of compliance mechanisms (what compliance mechanisms a regime occupies) and on which theoretical approach to compliance (enforcement or management) a regime builds its compliance system. These two independent constructs concern compliance, one of the aspects of regime effectiveness. The two other components of regime effectiveness, participation and commitments, according to Barrett (2008:242, 243), are not taken into account. It is unlikely that two independent variables mainly concerning compliance ("nature of compliance mechanisms" and "approach to compliance") are sufficient to explain most of the variance in regime effectiveness (goal attainment and problem change). More independent variables will likely be needed.

Young's second independent construct, approach to compliance, also concerns compliance, since the enforcement school and the management school are theoretical approaches to compliance. Towards the end of the chapter, Young concludes that "[t]his evidence suggests

that there are good reasons for selecting a management approach over an enforcement approach [to compliance], at least when the problem at hand is environmental in character" (Breitmeier et al 2006:186). Based on the focus on compliance in Young's analysis, it seems fair to say that Young and Zürn study similar constructs to some extent.

### 5.2.3 Operationalization

Although I claim that the constructs in the analyses of Young and Zürn are related, their operational variables are different. Young uses two operational variables to measure his dependent construct of regime effectiveness, namely goal attainment and problem change. Zürn uses only one operational variable to measure his dependent construct of compliance, namely conformity with regime provisions. Both Young and Zürn also examine the causal impact of the regime on goal attainment and problem change, and conformity, respectively.

Young and Zürn choose different operational independent variables. However, one independent variable is the same: RA 47 Compliance mechanisms. This variable proves to be a central explanatory variable, both for compliance and regime effectiveness, in the multivariate statistical analysis in chapter 6 of my thesis. The fact that Young and Zürn use the same independent variable does not imply that they will get the same results. After all, their dependent variables are different. But it is an indication that their results should be somewhat similar and that perhaps different interpretations of the results is a possible cause of the different conclusions.

### 5.2.4 Theoretical approaches

The enforcement school and the management school are theoretical approaches to compliance. Both Young and Zürn present the views of these two schools in their analyses. In his the conclusion, Zürn supports a majority of the views of the enforcement school, while Young largely supports and encourages the use of compliance mechanisms associated with the management school. Could it be the case that the two authors have different preconceptions about what theoretical approach is the better one, and that this has "colored" their conclusions? According to their theoretical expectations, it is not obvious that they favor one theoretical school over another. Both Young and Zürn give a fairly objective description of the theoretical approaches to compliance.

But it is striking that when summarizing their results, Young chooses to focus almost solely on the results favoring the management school while Zürn has a clear focus on the results favorable to the enforcement school. I come back to this point later, in subsection 5.2.7 Interpretation of results.

## 5.2.5 Research question

The two authors' research questions differ. Zürn examines horizontal mechanisms for inducing compliance and their effect on compliance rates.

Young considers whether "regimes are largely epiphenomena incapable of operating effectively as sources of governance under any but the most limited of circumstances" (Breitmeier et al 2006:113). He aims to answer this question by examining (a) the effect of decision rules and (b) the effect of compliance mechanisms on regime effectiveness. The analysis of compliance mechanisms on regime effectiveness is the one considered in this thesis.

## 5.2.6 Validity

There are at least three kinds of validity. Construct validity concerns the extent to which the constructs of theoretical interest are successfully measured by the operational variables (Hoyle, Judd and Harris 2002:33). Internal validity concerns the extent to which one can draw "causal conclusions about the effect of the independent variable on the dependent variable" (Hoyle, Judd and Harris 2002:33). External validity concerns the extent to which one can generalize the research results from the sample to the population (Hoyle, Judd and Harris 2002:33). For the purpose of this thesis, examining construct validity of the research of Young and Zürn is the most fruitful.

### Construct validity

> If the observed variables do not have construct validity, there is no way the research can inform our theory. Even worse, poor construct validity can actually mislead researchers by yielding seemingly positive results that in actuality do not reflect the constructs of interest (Hoyle, Judd and Harris 2002:35).

The quote above explains the consequences that can follow from low construct validity. The construct validity of a piece of research is "the degree to which both the independent and the dependent variables accurately reflect or measure the constructs of interest" (Hoyle, Judd and Harris 2002:32). The figure below illustrates this. The grey area represents the construct validity, and should be as large as possible to increase the validity of the research. Alternatively, one could use multiple operational variables, in order to capture a larger portion of the construct.

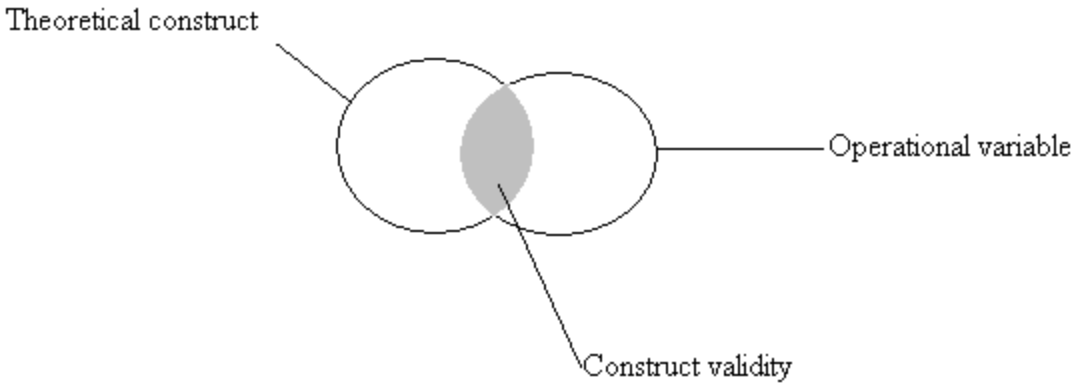


Figure 5.1

### Young's variables

When Young introduces his research question, regime effectiveness is only briefly explained as consisting of attainment of goals and "progress toward solving the problems" that led to the regime's creation (Breitmeier et al 2006:114). On at least one more occasion later in the chapter, he touches on the definition again, but without explicitly defining regime effectivness: "… alternative decision rules will influence the behavior of various actors and ultimately contribute to solving the problems that gave rise to regime formation" (Breitmeier et al 2006:122). The last part of this quote, "solving the problems that gave rise to regime formation," is very similar to Underdal's (2002) definition of regime effectiveness. The problem, therefore, is not that regime effectiveness is not discussed but rather that it is never explicitly defined. Hoyle, Judd and Harris (2002:79) write that: "… measurement always presupposes a prior clearly defined construct." This clear definition of the construct to be measured, should further guide the researcher in the choice of operational definitions in order to measure the variance in the dependent variable as accurately as possible (Hoyle, Judd and Harris 2002:79). Without a clear starting point for the analysis, it is difficult to judge whether

Young has chosen good operationalizations of the construct and thereby difficult to determine the construct validity.

What I refer to as independent constructs in Young's analysis, are not really constructs. A construct is an abstraction "that social scientists discuss in their theories" (Hoyle, Judd and Harris 2002:75). Constructs cannot be measured directly but require that the researcher finds "concrete representations that approximate what we mean when we speak of such concepts" (Hoyle, Judd and Harris 2002:75). In Young's analyses, the independent variables "nature of compliance mechanisms" and "approach to enforcement" are operational variables (RA 47 and RA 49 respectively) rather than abstractions derived from theory. It is therefore less relevant to talk about construct validity of Young's independent variables.

### Zürn's variables

The operational variable "Conformity with regime provisions" covers large parts of the construct of compliance. "Compliance can be said to occur when the actual behavior of a given subject conforms to prescribed behavior" (Breitmeier et al 2006:65) is a theoretical definition of compliance. Variable RC 5 in the IRD arguably overlaps largely with the theoretical definition: "Does the behavior of important actors generally conform to the provisions of the regime? Did the regime exert a causal influence on these developments?" It is reasonable that Zürn measures what he actually wants to measure when he uses variable RC 5 as the operational variable for compliance. In other words, the construct validity is high.

Zürn recognizes that the operational variables available in the IRD are insufficient to measure some of his independent constructs. For instance, Zürn finds no good indicators of the construct "internalization," but uses an indicator not directly relevant for measuring internalization of international law into national legal systems: RA 11 – "Are the regime's substantive rules legally binding on the members, or do they have the character of soft law (e.g. ministerial declarations, codes of conduct)?" Choosing indicators likely to explain only a small part of the variance in the dependent variable decreases construct validity because the chosen variables measure other constructs than what the researcher is interested in measuring.

## 5.2.7 Interpretation of results

In addition to reading the interpretations and conclusions written by Young and Zürn in their respective chapters, it is interesting to take a closer look at the tables with the bivariate analyses, also included in their chapters. In order to identify possible differences between Zürn and Young's interpretations of the results, I choose to take a closer look at variable RA 47 used by both researchers.

Zürn has grouped the results for the values 0-2 and 7-11 together[4]. These values represent either no compliance mechanisms or mechanisms associated with the management school. The remaining values (3-6)[5], the ones associated with the enforcement school, are individual categories in the table. It seems natural to ask why Zürn has grouped the management school mechanisms together, and why he has put them together with the values that represent no compliance mechanisms. Is he more interested in the results for the individual enforcement school mechanisms than the individual management school mechanisms? Judging from the focus on the results associated with the enforcement school mechanisms in his comments of the results, the answer to this question is yes. The comments of the results are mainly concerned with the strong positive results of negative compliance mechanisms (i.e. values 3-6) on compliance levels, despite the fact that the statistical results for the management school mechanisms are equally convincing. It is interesting to take a closer look at the results in the table:

[4] 0 – not applicable, 1 – no compliance mechanisms, 2 – issuance of notices of violation, 7 – support for capacity building to enhance compliance, 8 – granting of a transition period to achieve compliance, 9 – dissolution of linkages, 10 – additional compliance mechanisms, 11 – don't know

[5] 3 – suspension of membership rights, 4 – exclusion from membership, 5 – imposition of military punishments, 6 – imposition of financial/economic punishments

Table 3.6
Compliance mechanisms (RA 47)

| | | FORMAL COMPLIANCE MECHANISMS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | All cases | | Sum of 0–2; 7–11* | | 3 | | 4 | | 5 | | 6 | |
| CONFORMITY | 1 | 32 | 17.2% | 29 | 17.2% | 3 | 42.9% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| | 2 | 90 | 48.4% | 79 | 46.7% | 3 | 42.9% | 2 | 100.0% | 1 | 100.0% | 5 | 71.4% |
| | 3 | 45 | 24.2% | 43 | 25.4% | 1 | 14.3% | 0 | 0.0% | 0 | 0.0% | 1 | 14.3% |
| | 4 | 16 | 8.6% | 15 | 8.9% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 14.3% |
| | 5 | 3 | 1.6% | 3 | 1.8% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Total | | 186 | 100.0% | 169 | 100.0% | 7 | 100.0% | 2 | 100.0% | 1 | 100.0% | 7 | 100.0% |
| | | All cases | | Sum of 0–2; 7–11* | | 3 | | 4 | | 5 | | 6 | |
| CONFORMITY_CAUSAL | 1 | 9 | 4.8% | 9 | 5.3% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| | 2 | 47 | 25.3% | 42 | 24.9% | 5 | 71.4% | 1 | 50.0% | 0 | 0.0% | 2 | 28.6% |
| | 3 | 20 | 10.8% | 108 | 63.9% | 2 | 28.6% | 1 | 50.0% | 1 | 100.0% | 5 | 71.4% |
| | 4 | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| | 5 | 13 | 7.0% | 10 | 5.9% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Total | | 89 | 47.8% | 169 | 100.0% | 7 | 100.0% | 2 | 100.0% | 1 | 100.0% | 7 | 100.0% |

Table 5.1

(Breitmeier et al 2002:80).

Table 5.1 from Zürn's analysis of the effect of compliance mechanisms on conformity shows that:

- Few regimes make use of enforcement school mechanisms.
- A majority of the regimes make use of management school mechanisms.
- The behavior of 42.9 percent of the member states in regimes with the compliance mechanism "suspension of membership rights" (value 3 on the compliance mechanism variable) exceeds the regime requirements (value 1 on the conformity variable). Another 42.9 percent of the member states in regimes with value 3 behave in a way that meets regime requirements. These are impressive numbers. But because of the small number of regimes using enforcement school mechanisms, these 85.8 percent represent only 6 regimes. Such a low number of units could mean that the results are not very robust.
- The behavior of 46.7 percent of the member states in regimes with values 0-2 or 7-11 (no compliance mechanisms or management school mechanisms) meets regime

requirements (value 2 on the conformity variable). Another 17.2 percent of the member states behave in a way that exceeds regime requirements (value 1). Together, these two percentages represent 108 regimes, and this fact makes the evidence for the values 0-2 and 7-11 more robust. Still, Zürn does not comment on these numbers.

Zürn is more interested in the mechanisms related to what he calls real enforcement. He writes this explicitly in his comments to the results. For the construct "incentives," operationalized by the variable in question (RA 47), he concludes that: "the presence of such mechanisms increases both compliance rates and the causal roles regimes play in promoting compliance" (Breitmeier et al 2006:78), referring to the compliance mechanisms with values 3-6.

When commenting on the results for RA 47 compliance mechanisms' effect on goal attainment and problem change, Young chooses to comment only on the most robust results. These are the results for the category "no compliance mechanisms" and the results for typical management school mechanisms: capacity building, notices of violation and granting of a transition period. Although only 18 regime elements (5.68 percent) possess the compliance mechanism "imposition of financial/economic punishments," all of these fulfill their goals (100 percent). The results for this mechanism are convincing but are left uncommented, probably due to the small numbers of regimes using this mechanism.

The results of the independent variable RA 47 compliance mechanisms on conformity, goal attainment and problem change are fairly similar. Compliance mechanisms associated with the management school are more frequently used by regimes than compliance mechanisms associated with the enforcement school. The compliance mechanisms associated with the management school positively effect conformity, goal attainment and problem change to a large extent, but so do the compliance mechanisms associated with the enforcement school. The biggest difference is that the results for the enforcement school compliance mechanisms are less robust than the results for management school compliance mechanisms because relatively few regimes use them. Because of the similar results of this variable in both Young and Zürn's analyses, one would expect that their comments on and interpretations of these results also would be similar. But they are not. While Zürn chooses to focus largely on interpreting the results for the enforcement school compliance mechanisms, Young focuses mostly on the results for the management school compliance mechanisms. This could be a

contributing factor to their different conclusions although this evaluation of interpretation of results only concerns one independent variable.

## 5.3 Summary

My examination of Young and Zürn's analyses in this chapter indicates that their differing conclusions have something to do with operationalization, validity and interpretation of results. However, it is not easy to pinpoint what the exact relationship between these factors and the differing conclusions is. The examination suggests two causes of the differing conclusions: First, higher construct validity could perhaps have led to more similar results and possibly more similar conclusions. The examination indicates that the construct validity of Zürn's analysis is lower than desirable due to the operationalizations of some of the independent variables. It is difficult to determine the construct validity of Young's analysis because of a lack of an explicit definition of regime effectiveness. Second, different interpretations of results might contribute to the differing conclusions. In their interpretations of the results Young tends to focus on the results associated with the management school, while Zürn focuses on results associated with the enforcement school.

My qualitative examination of the similarities and differences in the analyses of Young and Zürn has not led to any clear findings with regard to the research question. In the next chapter, I use quantitative techniques to analyze data from the IRD in order to find clearer answers to my research question.

# 6 A multivariate analysis of compliance and regime effectiveness

The examination of differences and similarities between the analyses of Oran Young and Michael Zürn in Chapter 6 provided some answers to my research question. The purpose of this chapter is to identify additional reasons for why the authors have reached different conclusions, this time through multivariate statistical analysis. By using multivariate statistical techniques to analyze the variables from the IRD previously investigated by Young and Zürn, it might be possible to find more precise answers to my research question. I transferred the data I use in my analyses (parts of IRD) from Microsoft Access via Excel to SPSS to make use of multivariate statistical techniques. In section 6.1, I justify my choice of multivariate analysis. In section 6.2, I provide an account of Young and Zürn's hypotheses. In section 6.3, I present my six analyses of Young and Zürn's dependent variables. In section 6.4, I discuss the results from my analyses, and in section 6.5 I summarize my findings.

## 6.1 Multivariate statistical analysis

Using bivariate techniques to analyze data provides the researcher with valuable information about the effect of variable X on variable Y. But a simple bivariate model is seldom sufficient to explain variance in the dependent variable. Through multivariate analyses of the variables used by Young and Zürn I aim to (i) explain more of the variance in the dependent variable, (ii) find more robust results by controlling for other independent variables when analyzing one independent variable's effect on a dependent variable, and (iii) find out which independent variables affect which dependent variables, and which independent variables have no effects at all. This third point is particularly interesting because the dependent variables of compliance and regime effectiveness are different but closely related concepts.

## 6.2 Hypotheses

### 6.2.1 Zürn's hypotheses

Zürn provides four hypotheses that concern the outcome of his analyses:

1. Incentives improve compliance rates.

The incentives perspective includes positive and negative sanctions, verification of implementation and review of implementation. The operational variables measuring this perspective are RA 47 Compliance mechanisms, RA 45 Reporting procedures and RA 46 Implementation review (Breitmeier et al 2006:72-78).

2. Legalization improves compliance rates.

a. Juridification improves compliance rates.

Juridification particularly focuses on the preciseness and clarity of rules. The operational variables measuring juridification are RA 12 Preciseness of rules, RA 29 Secretariat establishment, RA 30 Secretariat independence, and RA 33 Decision making bodies (Breitmeier et al 2006:83-90).

b. Internalization improves compliance rates.

Internalization of rules means to incorporate regulations into existing rule-of-law systems. The operational variable measuring internalization is RA 11 Legally binding (Breitmeier et al 2006:90-91).

3. Legitimacy improves compliance rates.

Legitimacy includes the importance of legitimate, fair and just rules, as well as fairness and justice in the making of these rules. The operational variables measuring legitimacy are RF 46 States participating, RF 49 Non-state actors, and RF 19 Issue-area specific power (Breitmeier et al 2006:91, 96-103).

4. Responsiveness to problems of implementation improves compliance rates.

Responsiveness to problems of implementation focuses on the resources available for the parties to implement rules and the flexibility of the compliance-management system “to adapt or adjust to new problems” (Breitmeier et al 2006:105). The operational variables measuring responsiveness are RA 13 Rule differentiation and RA 47 Compliance mechanisms (Breitmeier et al 2006:105-108).

### 6.2.2 Young's hypotheses

Young does not provide explicit hypotheses concerning what he expects to find in his analyses. However, based on the theoretical reasoning in Young's chapter, I formulate six concrete hypotheses:

1. Mechanisms capable of generating rewards and penalties improve compliance rates.
2. Mechanisms capable of generating rewards and penalties improve regime effectiveness.
3. Operation of compliance mechanisms, but not necessarily the use of penalties and rewards, increases compliance rates.
4. Operation of compliance mechanisms, but not necessarily the use of penalties and rewards, improves regime effectiveness.
5. There is no clearcut relationship between compliance mechanisms and compliance rates.
6. There is no clearcut relationship between compliance mechanisms and regime effectiveness.

Hypotheses 1 and 2 are associated with those who support the enforcement school. Hypotheses 3 and 4 are associated with those who support the management school. Hypotheses 5 and 6 are associated with those who support the social-practice perspective.

### 6.2.3 My general expectations

At the outset, I expect the findings of Zürn and Young to be confirmed by my six analyses. However, it is likely that I will get different results to some extent because of the use of multivariate analysis (adding all independent variables at the same time and estimating controlled effects).

I expect Zürn's independent variables to have the greatest effects on Zürn's dependent variables, and Young's independent variables to have the greatest effects on Young's dependent variables. Because Young's independent variables both relate to the concept of compliance, I also expect to find that Young's independent variables significantly affect

Zürn's dependent variable, compliance. If Young's independent variables have moderate to strong effects on compliance, it would support my expectation. It would also reinforce Young's conclusions and make them more convincing and relevant for the compliance debate.

## 6.3 The analyses

I analyze a total of six dependent variables. First, I analyze the dependent variables used by Zürn, conformity and conformity causal:

- RC 5 Conformity: "Does the behavior of important actors generally conform to the provisions of the regime?"
- RC 5 Conformity causal: "Did the regime exert a causal influence on these developments?"

Second, I analyze the first couple of dependent variables used by Young, goal attainment and goal attainment causal:

- RC 10 Goal attainment: "Taken together, did the behavioral changes lead to the fulfillment of the stated and/or unstated goals of the regime?"
- RC 10 Goal attainment causal: "What causal impact did the regime have in producing these changes?"

Third, I analyze the other pair of dependent variables used by Young, problem change and problem change causal:

- RC 11 Problem change: "How did the state of the world change during this period with respect to the problems addressed by the regime?"
- RC 11 Problem change causal: "Did the regime exert a causal influence on these developments?"

I include all ten independent variables in my six analyses, both the ones used by Zürn in his analyses and the ones used by Young in his analyses[6]. These include:

- RA 11 Legally binding rules: "Are the regime's substantive rules legally binding on the members, or do they have the character of soft law (e.g. ministerial declarations, codes of conduct)?"

- RA 12 Preciseness of rules: "Are the regime's substantive rules generally precise and easy to interpret in the sense that they call for well-defined actions, or are they ambiguous and indeterminate?"

- RA 13 Rule differentiation: "Does the regime have substantive rules that differentiate among its members in terms of requirements, prohibitions, or permissions?"

- RA 30 Secretariat independence: "How independent is the secretariat from the regime's members?"

- RA 33 Decision-making bodies: "What decision-making bodies are provided for in the regime?"

- RA 45 Reporting procedures: "Are there reporting procedures requiring the submission of information by individual members pertaining to regime implementation?"

- RA 46 Implementation review: "Are there procedures for reviewing implementation formally or not formally established in the regime's constitutive provisions?"

- RA 47 Compliance mechanisms: "What formal compliance mechanisms are provided for in the regime's constitutive provisions to achieve compliance?"

- RA 49 Compliance approach: "Do these procedures generally reflect an enforcement approach or a management approach to compliance?"

[6] All of Young's and Zürn's independent variables are included except for RA 29: "Did the members of the regime establish a secretariat for the regime as a whole or any of its elements?" and RF 46: "Were there states not participating in the negotiation process that other actors believed should have participated?". These two variables were not found in the Microsoft Access document with the IRD.

- RF 19 Symmetrical power: "Were the nations involved in regime formation roughly symmetrical in terms of issue-specific power or did the process involve sharp differences in power resources?"

- RF 49 Non-state actors: "What roles did non-state actors play in the negotiations?"

Young uses the variables RA 47 and RA 49 in his analysis. Zürn uses the remaining variables, RA 11, RA 12, RA 13, RA 30, RA 33, RA 45, RA 46, RF 19 and RF 49. Both Zürn and Young use variable RA 47. I have adjusted all ten independent variables according to the formal requirements for analyzing them using regression[7]. I analyze the six dependent variables sequentially. This means that in each analysis, I add the independent variables RA49 Compliance approach and RA 47 Compliance mechanisms (Young's independent variables, including the variable in which both Young and Zürn uses, RA 47) in model 1 of the analysis, while I add the remaining independent variables (Zürn's independent variables) in model 2 of the analysis.

### 6.3.1 Excluded variables

Preliminary analyses of the dependent variables show that the variables RA 12 Preciseness of rules, RA 46 Implementation review and RF 19 Symmetrical power contribute to high multicolinearity. I therefore exclude these from all six analyses.

The dummy variables RA 30_5 Secretariat independence – High, RA 47_4 Exclusion from membership, and RA 47_9 Dissolution of linkages are constants, and SPSS excludes them from the analyses.

### 6.3.2 Analyzing ordinal dependent variables

Five of the six dependent variables to be analyzed are ordinal-level variables[8]. Using linear regression (Ordinary Least Square, OLS) formally requires that all variables are at least at

[7] Nominal and ordinal variables are recoded into dummy variables. The values "Not applicable" and "Don't know" are user-defined as missing because they are of low interest for the analysis. Furthermore, the units coded by Kate O'Neill have high missing values, and are therefore excluded from the analysis.

[8] RC 5 Conformity, RC 5 Conformity causal, RC 10 Goal attainment causal, RC 11 Problem change and RC 11 Problem change causal are ordinal-level variables when the categories 0 (Not applicable) and 5 (Don't know) are defined as missing. RC 10 Goal attainment is a dichotomous variable when values 0 and 5 are defined as missing.

interval scale. There are at least three possible ways to analyze an ordinal dependent variable in regression analysis (Halpin 2003 URL; Torra et al 2006:467):

a) Treat the variable as numerical and use regular OLS

b) Dichotomize the variable and use binary logistic regression

c) Use ordinal logistic regression, if one can argue that the ordinal variable represents measurements of an underlying continuous variable.

Alternative a), treating the variable as a numerical (continuous) variable is an "easy and common choice" (Torra et al 2006:467). According to Torra et al (2006:467) this alternative is reasonable if the dependent variable has a minimum of five categories. In my analyses, I treat the dependent variables RC5 Conformity, RC11 Problem change, and RC11 Problem change causal, as interval variables and analyze them using regular linear regression (OLS). These variables fulfill the requirement of having at least five categories. Some authors would argue that choosing to treat ordinal variables as continuous variables is problematic: "Hawkes (1971), Morris (1970), O'Brien (1982), Reynolds (1973), Somers (1974), and Smith (1974), among others, suggest that the biases in using continuous-variable methods for ordinal variables are large and that special techniques for ordinal variables are required" (Winship and Mare 1984:512). Other authors disagree and argue that the benefits of treating the ordinal dependent variable as continuous are larger than the drawbacks: "Allan (1976), Borgatta (1968), Kim (1975, 1978), Labowitz (1967, 1970), and O'Brien (1979a), among others, claim that multivariate methods for interval-level variables should be used for ordinal variables because the power and flexibility gained from these methods outweigh the small biases that they may entail" (Winship and Mare 1984:512).

Alternative b), dichotomizing the variables is a possible alternative for the ordinal variables with less than five categories. In order to preserve as much of the information in the independent variables as possible, however, I choose not to dichotomize the variables which possess less than five categories. To analyze the dependent variables RC 5 Conformity causal and RC 10 Goal attainment causal, I could have included both value 4 (Negative causal influence), by recoding it to value -1, and value 5 (Don't know). Then the variables would fulfill the requirement of five categories. However, variable RC 5 was transferred to SPSS by

a group of researchers previously[9], without including category 4 Negative causal influence. This is perhaps because no one answered this category. Ten regimes answer "Don't know" (5) on RC 5 Conformity causal. I have analyzed RC 5 Conformity causal and included value 5 but this did not lead to changes in the results. On RC 10 Goal attainment causal only one unit answer category 4 Negative causal influence. No units answer "Don't know" (5). For these reasons, I do not include value 4 or 5 in the analysis of RC 10 Goal attainment causal. In spite of the low number of categories on this variable I treat RC 5 and RC 10 as interval scale variables and use OLS as the method of analysis.

The dependent variable RC 10 goal attainment, is a dichotomous variable. I analyze this variable using binary logistic regression. The distribution of units is too skewed to perform linear regression[10].

Alternative c), using ordinal logistic regression, is also a possible way to analyze the ordinal variables. I chose not to use this method of analysis due to time constraints and lack of experience with this method. It would, however, be interesting to analyze the IRD data using ordinal logistic regression at a later stage and compare the results with the results from the analyses below.

### 6.3.3 Analysis 1 – Compliance

#### The dependent variable

Zürn measures his dependent construct "compliance" using the variable "RC 5 Conformity".

#### The results

| Model | R | R Square | Adjusted R Square | R Square Change | N |
|---|---|---|---|---|---|
| 1 | .562 | .315 | .233 | .315 | 66 |
| 2 | .668 | .446 | .200 | .130 | 66 |

Table 6.1

[9] Data received from professor Arild Underdal.
[10] If the units are evenly distributed across the two values of the dependent variable (skewness less than .25/.75) and the number of units analyzed is large, linear regression can be used (Christophersen 2007:203).

Table 6.1 shows that Young's variables account for 31.5 percent of the explained variance for the dependent variable, compliance. Zürn's variables account for only 13 percent of the explained variance in the dependent variable, compliance. Together, the variables account for almost half of the explained variance for compliance, 44.6 percent. This indicates that Young's independent variables are relatively more important for explaining compliance, than Zürn's independent variables are. The results in table 6.1 are somewhat misleading, however, because both Young and Zürn use variable RA 47, which is attributed to Young in model 1. Since part of the variance in model 1 is attributable to RA 47, it is incorrect to conclude that the explained variance in model 1 is only attributable to Young's variables. But except for variable RA 47, all of Zürn's independent variables seem to explain much less of the variance in compliance than expected.

Table 6.2 show the estimated effects for the independent variables on all dependent variables:

| | | Dependent variables | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RC 5 Conformity | | | RC 5 Conformity causal | | | RC 10 Goal attainment | | | RC 10 Goal attainment causal | | | RC 11 Problem change | | | RC 11 Problem change causal | | |
| | | **B** | **β** | **Sig** | **B** | **β** | **Sig** | **B** | **Sig** | **Exp (B)** | **B** | **β** | **Sig** | **B** | **B** | **Sig** | **B** | **B** | **Sig** |
| **Independent variables** | **MODEL 1** | | | | | | | | | | | | | | | | | | |
| | Constant | 3.183 | | .000 | 2.874 | | .000 | -3.060 | .087 | .047 | 1.814 | | .000 | 4.064 | | .000 | 2.568 | | .003 |
| | RA 47_2 Notices of violation | .380 | .136 | .261 | .371 | .158 | .241 | 20.531 | .999 | 8.253E8 | .434 | .241 | .033 | .562 | .127 | .299 | 1.529 | .306 | .012 |
| | RA 47_3 Suspension of membership rights | .042 | .007 | .947 | -.168 | -.036 | .776 | | | | -1.535 | -.300 | .005 | -1.500 | -.201 | .092 | .429 | .051 | .659 |
| | RA 47_4 Exclusion from membership | | | | | | | | | | | | | | | | | | |
| | RA 47_5 Imposition of military punishments | .693 | .248 | .045 | -.059 | -.025 | .853 | 20.278 | .999 | 6.405E8 | .231 | .115 | .297 | .050 | .014 | .910 | .528 | .132 | .280 |
| | RA 47_6 Imposition of financial/economic punishments | .617 | .185 | .126 | .401 | .143 | .284 | | | | .465 | .215 | .052 | .354 | .080 | .516 | .261 | .052 | .663 |
| | RA 47_7 Capacity building | -.527 | -.180 | .139 | .384 | .155 | .247 | | | | .505 | .280 | .014 | .757 | .205 | .103 | 1.317 | .316 | .011 |
| | RA 47_8 Transition period | -.950 | -.356 | .006 | .901 | .400 | .005 | 19.529 | .998 | 3.029E8 | -.160 | -.112 | .339 | .375 | .128 | .331 | .303 | .092 | .475 |
| | RA 47_9 Dissolution of linkages | | | | | | | | | | | | | | | | | | |
| | RA 49 Compliance approach | .183 | .071 | .537 | -.138 | -.064 | .620 | 2.367 | .015 | 10.667 | .360 | .190 | .076 | -.376 | -.111 | .365 | .002 | .001 | .996 |
| | **MODEL 2** | | | | | | | | | | | | | | | | | | |
| | Constant | 3.530 | | .037 | 1.052 | | .435 | 34.457 | .998 | 9.211E14 | 2.290 | | .004 | 6.314 | | .000 | 2.108 | | .218 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RA 47_2 Notices of violation | .313 | .112 | .550 | .210 | .089 | .621 | -27.281 | .998 | .000 | .314 | .174 | .212 | -.043 | -.010 | .936 | .884 | .177 | .159 |
| | RA 47_3 Suspension of membership rights | -.097 | -.017 | .900 | .028 | .006 | .965 | | | | -1.873 | -.366 | .000 | -2.030 | -.272 | .012 | .121 | .014 | .893 |
| | RA 47_4 Exclusion from membership | | | | | | | | | | | | | | | | | | |
| | RA 47_5 Imposition of military punishments | .472 | .169 | .310 | -.196 | -.083 | .602 | 47.317 | .995 | 3.543E20 | .506 | .251 | .073 | .178 | .050 | .697 | .547 | .137 | .298 |
| | RA 47_6 Imposition of financial/economic punishments | -.036 | .185 | .947 | -.077 | -.027 | .863 | | | | .796 | .270 | .005 | .511 | .115 | .319 | -.122 | -.024 | .835 |
| | RA 47_7 Capacity building | -.519 | -.177 | .241 | .779 | .315 | .033 | | | | .753 | .349 | .004 | .591 | .160 | .155 | 1.405 | .337 | .004 |
| | RA 47_8 Transition period | -.972 | -.364 | .022 | .855 | .380 | .013 | 140.167 | .991 | 7.475E60 | .010 | .007 | .953 | .886 | .302 | .018 | .797 | .241 | .060 |
| | RA 47_9 Dissolution of linkages | | | | | | | | | | | | | | | | | | |
| | RA 49 Compliance approach | .204 | .079 | .629 | .245 | .113 | .475 | 2.615 | .145 | 13.669 | .254 | .134 | .249 | -.047 | -.014 | .907 | .475 | .124 | .307 |
| | RA 11 Legally binding | -.021 | -.009 | .951 | -.142 | -.070 | .604 | -30.103 | .991 | .000 | -.336 | -.230 | .042 | -.926 | -.309 | .008 | -.390 | -.115 | .318 |
| | RA 13 Rule differentiation | -.578 | -.126 | .446 | 1.085 | .280 | .082 | 139.634 | .993 | 4.390E60 | .488 | .242 | .078 | -.148 | -.036 | .787 | .784 | .168 | .213 |
| | RA 30_2 Secretariat independence – Less | .053 | .025 | .896 | -.566 | -.317 | .093 | -32.306 | .990 | .000 | -.368 | -.263 | .065 | -.754 | -.286 | .056 | -.779 | -.263 | .084 |
| | RA 30_3 Secretariat independence – Some | .277 | .133 | .530 | -.215 | -.122 | .549 | -1.865 | .359 | .155 | -.200 | -.151 | .345 | -.154 | -.058 | .725 | -.080 | -.027 | .874 |
| | RA 30_4 Secretariat independence – Strong | -.002 | .000 | .997 | .483 | .184 | .277 | -93.642 | .991 | .000 | -.538 | -.367 | .033 | -.991 | -.322 | .054 | -.375 | -.108 | .519 |
| | RA 30_5 Secretariat independence – High | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RA 33_2 Decision making bodies – Ad hoc COP | -.270 | -.135 | .583 | -.615 | -.363 | .129 | 1.312 | .519 | 3.712 | .401 | .319 | .086 | -.142 | -.056 | .758 | -.754 | -.263 | .158 |
| | RA 33_3 Decision making bodies – Standing subsidiary body | -.344 | -.176 | .343 | -.443 | -.268 | .136 | -30.134 | .991 | .000 | -.031 | -.026 | .867 | -1.405 | -.576 | .000 | -2.049 | -.746 | .000 |
| | RA 33_4 Decision making bodies – Ad hoc subsidiary body | .777 | .139 | .362 | -.037 | -.008 | .957 | | | | .327 | .125 | .334 | -.811 | -.151 | .255 | -.536 | -.089 | .511 |
| | RA 45 – Reporting procedures | -.059 | -.027 | .887 | .210 | .111 | .539 | -43.939 | .991 | .000 | -.194 | -.144 | .276 | -.030 | -.010 | .931 | .152 | .046 | .703 |
| | RF 49_2 Non-state actors – Member of nat. del. | .532 | .068 | .648 | .677 | .102 | .475 | | | | -.478 | -.093 | .424 | .615 | .059 | .612 | .561 | .047 | .687 |
| | RF 49_3 Non-state actors – Member of neg. body | .493 | .250 | .257 | .661 | .397 | .065 | -27.881 | .992 | .000 | .446 | .374 | .038 | .142 | .060 | .741 | .583 | .217 | .240 |
| | RF 49_4 Non-state actors – Pressure inside neg. | .715 | .288 | .125 | .199 | .095 | .595 | 110.125 | .992 | 6.711E47 | .143 | .089 | .533 | -.094 | -.028 | .844 | .588 | .154 | .285 |
| | RF 49_5 Non-state actors – Pressure outside neg. | .783 | .381 | .109 | .565 | .326 | .153 | 1.783 | .510 | 5.946 | -.055 | -.043 | .815 | -.060 | -.022 | .904 | .547 | .182 | .338 |

Table 6.2

In model 1, there are two significant effects. Other things being equal[11], conformity with regime requirements (compliance) increases by .693 scale units, when a regime[12] uses military punishments instead of no compliance mechanisms ($p<0.05$)[13]. Conformity with regime requirements decreases by .950 scale units when a regime grants transition periods to the parties instead of having no compliance mechanisms ($p<0.01$). In model 2, the conformity level decreases by .972 scale units for regimes using transition periods compared to having no compliance mechanisms ($p<0.05$). These effects give support to the enforcement perspective and Zürn's conclusions, since military punishments (a negative incentive) have a positive influence on compliance levels, while transition periods (a positive incentive, associated with the management school) have a negative influence on compliance levels. However, one should also take into account the evidence from a univariate analysis of the data showing that most regimes rely on a management approach to compliance. This univariate analysis supports the results from the bivariate statistics by Young and Zürn, which show that a large majority of the regimes have a management approach to compliance. Furthermore, descriptive statistics of RA 47 compliance mechanisms show that most regimes have no compliance mechanisms (43 percent), 10.9 percent use the mechanism "granting of a transition period" and 7.9 percent use the mechanism "imposition of military punishments". Only two regimes use the compliance mechanism "suspension of membership rights". The results for this category are therefore likely to be somewhat less robust than the other results. Apart from this category, the units spread out fairly evenly (between 3.6 and 6.7 percent) across the rest of the categories of RA 47 compliance mechanisms (capacity building, imposition of financial/economic punishments and issuance of notices of violation).

Considering that the scale for the variable RC 05 Conformity ranges from 1 (Behavior does not conform at all) to 5 (Behavior exceeds regime requirements), the effects of transition periods to achieve compliance (-.950 and -.972) are moderate to strong negative effects. The effect of imposing military punishments (.693) is a moderate positive effect. RA 47_8 transition periods has Beta value -.356 in model 1 and -.364 in model 2. The Beta-values show that the effect of the compliance mechanism "transition period" is the strongest relative to the other effects.

[11] This condition applies to all the effects throughout the six analyses.
[12] The units of analysis are "regime elements" but in the interpretations of results the word "regime" is used instead for simplifying reasons.
[13] All the effects are estimated *expected* effects.

### 6.3.4 Analysis 2 – The regimes' causal influence on compliance

#### The dependent variable

Zürn also examines to what extent the regime has a causal influence on the parties' compliance. He operationalizes this construct using the variable "RC 5 Conformity causal". "0: Not applicable" and "5: Don't know" are user-defined missing. The scale then includes only three values: "1: Little or no causal influence", "2: Modest causal influence", and "3: Large causal influence".

#### The results

| Model | R | R Square | Adjusted R Square | R Square Change | N |
|---|---|---|---|---|---|
| 1 | .400 | .160 | .058 | .160 | 66 |
| 2 | .697 | .486 | .258 | .326 | 66 |

Table 6.3

Estimates of R Square reveal that Young's variables account for 16 percent of the explained variance of a regime's causal influence on compliance. Zürn's variables account for 32.6 percent of the explained variance, and together the variables account for 48.6 percent of the explained variance in the dependent variable.

In model 1, there is one significant effect. The results show that the regimes' causal influence on compliance increases by .901 scale units when regimes use the compliance mechanism "granting of a transition period", compared to regimes with no compliance mechanisms ($p<0.01$).

In model 2, when Zürn's independent variables are added to the analysis, there are two significant estimated effects. First, the data show that the regimes' causal influence on compliance increases by .779 scale units when regimes use capacity building as a compliance mechanism compared to using no compliance mechanisms ($p<0.05$). The effect of granting a transition period remains significant but decreases from .901 to .855 ($p<0.05$).

The results do not support the hypothesis that Young's independent variables have large explanatory value on the regimes' causal influence on compliance. Zürn's independent variables explain much more of the variance in the dependent variable than Young's.

### 6.3.5 Analysis 3 – Goal attainment

#### The dependent variable

The first operational variable measuring the theoretical construct of regime effectiveness, is RC10 Goal attainment. This is a variable with only two values: "1: No, goal not fulfilled", and "2: Yes, goal fulfilled" ("0: Not applicable" and "3: Don't know" are defined as missing values).

#### Excluded variables and N

The independent variables RA 30_5 Secretariat independence – High, RA 47_3 Suspension of membership rights, RA 47_4 Exclusion from membership, RA 47_6 Imposition of financial/economic punishments, RA 47_7 capacity building, RA 47_9 Dissolution of linkages, RA 33_4 Decision making bodies – Ad hoc subsidiary body, and RF 49_2 – Non-state actors – Member of national delegation, are excluded from the model, either because they are constants or too skewed and thereby create problems for the analysis. N = 76.

#### The results

The numbers indicating model fit[14] suggest that the model improves ($p<0.01$) when Zürn's variables are added to the analysis in model 2.

The estimated regression coefficient for RA 49 Compliance approach is the only significant effect in the model. This effect is significant ($p<0.05$) in model 1 and indicates a positive relationship between compliance approach and goal attainment. In other words, the odds for fulfilling the goals in a regime increase by the factor 10.667 for regimes adhering to a management approach to compliance, compared to regimes adhering to an enforcement approach to compliance.

[14] -2LL, Cox Snell R Square, Nagelkerke R Square, Omnibus test, Hosmer Lemeshow Chi-Square.

This result gives strong support to Young's conclusion about the value of choosing a management approach to compliance.

### 6.3.6 Analysis 4 – The regimes' causal influence on goal attainment

#### The dependent variable

Young also examines to what extent the regime exerts causal influence on the goal attainment of the regime. The operational dependent variable measuring this is RC 10 – Goals fulfilled causal. The values "0: Not applicable", "1: Don't know" and "4: Negative causal influence" are defined as missing. Three values remain: "1: Little or no causal impact", "2: Modest causal influence", and "3: Large causal influence".

#### The results

| Model | R | R Square | Adjusted R Square | R Square Change | N |
|---|---|---|---|---|---|
| 1 | .552 | .304 | .232 | .304 | 75 |
| 2 | .761 | .580 | .424 | .275 | 75 |

Table 6.4

The analysis of the regime's causal influence on goal attainment, the second dependent variable analyzed by Young, reveals some interesting results. Young's independent variables explain 30.4 percent of the variance in the dependent variable while Zürn's independent variables actually explain 27.5 percent. Together, the independent variables explain more than half of the variance in the dependent variable (58 percent).

In model 1, there are three significant effects. The model estimates that the regimes' causal influence on goal attainment increases by .434 scale units when regimes use the compliance mechanism "notices of violation", instead of no compliance mechanisms ($p<0.05$). The regimes' causal influence on goal attainment increases by .505 scale units when regimes use capacity building compared to no compliance mechanisms ($p<0.05$). On the contrary, the regimes' causal influence on goal attainment decreases by 1.535 scale units when regimes use suspension of membership rights compared to no compliance mechanisms.

In model 2, where Zürn's independent variables are added, there are six significant effects. Again, the variable RA 47 compliance mechanisms – used by both Young and Zürn – is predominant. The numbers again show that a regime's causal influence on goal attainment decreases by 1.873 scale units when regimes use suspension of membership rights compared to using no compliance mechanisms ($p<0.01$). In contrast, regimes' causal influence on goal attainment increases by .796 scale units when regimes use financial or economic punishments compared to when they use no compliance mechanisms ($p<0.01$). These two effects are strong, since the dependent variable only consists of three values. Regimes' causal influence on goal attainment also increases by .753 scale units when regimes use capacity building as a compliance mechanism compared to regimes with no compliance mechanisms ($p<0.01$). The effect of variable RF 49_3 Non-state actor – member of negotiating body, is also significant. This variable concerns the role of non-state actors in the negotiations towards an agreement, treaty etc. A regime's causal influence on goal attainment increases by .446 scale units when non-state actors are members of the negotiating body compared to those cases where non-state actors only have an observer role ($p<0.05$). Furthermore, the regimes' causal influence on goal attainment decreases by .336 scale units when rules are legally binding compared to when they are not ($p<0.05$). A regime's causal influence on goal attainment decreases by .538 scale units if it has a strongly independent secretariat (RA 30_4) compared to a secretariat with no independence ($p<0.05$).

The fact that Zürn's independent variables explain almost as much of the variance in the dependent variable as Young's do, runs counter to my expectations. It could be an indication that Young's analysis of regime effectiveness perhaps could have benefited from adding more independent variables because of the more complex nature of regime effectiveness compared to compliance. The positive effect of having non-state actors as members of the negotiating body (RF 49_3 Zürn's independent variable) supports this.

### 6.3.7 Analysis 5 – Problem change

#### The dependent variable

The other operational variable measuring the theoretical construct of regime effectiveness is problem change (RC 10). The values "0: Not applicable" and "6: Don't know" are user

defined as missing. The scale then ranges from “1: The problem worsened considerably” to “5: The problem improved considerably”.

## The results

| Model | R | R Square | Adjusted R Square | R Square Change | N |
|---|---|---|---|---|---|
| 1 | .322 | .104 | .013 | .104 | 77 |
| 2 | .749 | .561 | .404 | .457 | 77 |

Table 6.5

The table shows that there are large differences between the explained variance in model 1 and model 2. While the independent variables in model 1 only explain 10.4 percent of the variance in the dependent variable, the independent variables in model 2 explain 45.7 percent more. This means that Zürn’s independent variables actually explain more than four times as much of the variance in problem change, the dependent variable used by Young, as Young’s independent variables do.

In model 1, there are no significant effects. In model 2, it is once again the variable used by both Young and Zürn (RA 47 compliance mechanisms) that proves to have significant effects on problem change. More specifically, the problem becomes worse by 2.030 scale units, when regime elements suspend membership rights instead of having no compliance mechanisms ($p<0.05$). In other words, suspension of membership rights has a very strong negative effect on problem change. But the robustness of these results should be questioned because only two regimes use suspension of membership rights. The problem improves by .886 scale units, however, when member states are granted a transition period compared to when there are no compliance mechanisms ($p<0.05$). Granting a transition period has a moderate to strong positive effect on problem change. The estimated coefficient for RA 11 shows that the problem becomes worse by .926 scale units for regimes with legally binding rules compared to regimes with soft law or rules that are not legally binding ($p<0.01$). Finally, the problem becomes worse by 1.405 scale units for regimes making decisions in a standing subsidiary body compared to those regimes making decisions at regular meetings of the conference of the parties ($p<0.01$).

## 6.3.8 Analysis 6 – The regimes' causal influence on problem change

### The dependent variable

Also measuring regime effectiveness is the operational variable RC11 Problem change causal. "0: Not applicable" and "6: Don't know" are defined as missing. The scale ranges from "1: Little or no causal impact" to "5: Very strong causal influence".

### The results

| Model | R | R Square | Adjusted R Square | R Square Change | N |
|---|---|---|---|---|---|
| 1 | .380 | .145 | .058 | .145 | 77 |
| 2 | .738 | .544 | .382 | .400 | 77 |

Table 6.6

R Square results for RC 11 problem change causal are similar to the results for RC 11 problem change. Again, Zürn's independent variables explain far more of the variance in the dependent variable than Young's independent variables. Young's independent variables explain 14.5 percent of the variance in RC 11 problem change causal while Zürn's independent variables account for 40 percent of the explained variance.

The estimated coefficients in the model once again confirm the prominent role of RA 47 compliance mechanisms. In model 1, RA 47_2 Notices of violation and RA 47_7 capacity building have strong positive effects on the regime's causal influence on problem change. The regime's causal influence on problem change increases by 1.529 scale units when a regime uses notices of violation as a compliance mechanism instead of no compliance mechanisms ($p<0.05$). Furthermore, regimes' causal influence on problem change increases by 1.317 scale units for regimes facilitating capacity building compared to having no compliance mechanisms ($p<0.05$). In model 2, the effect of capacity building has increased to 1.405 ($p<0.01$). The effect of notices of violation is no longer significant but the effect of what decision-making bodies a regime has provided for (RA 33) is a significant and strongly negative effect. The regime's causal influence on problem change decreases with 2.048 scale units when a regime makes decisions in a standing subsidiary body instead of making decisions in regular meetings of the conference of the parties ($p<0.01$).

For both of the dependent variables regarding problem change, Zürn's independent variables account for a surprisingly large proportion of the explained variance. Looking at significant effects, his independent variables (except RA 47 compliance mechanisms) more frequently affect goal attainment and problem change than compliance. This might indicate that many of the independent variables chosen to analyze compliance are more relevant to analyze regime effectiveness.

## 6.4 Discussion of the results

In the beginning of this chapter, I presented three aims for my (multivariate) analyses: i) to explain more of the variance in the dependent variable, ii) to find more robust results by controlling for other independent variables when analyzing an independent variable's effect on a dependent variable, and iii) find out which independent variables affect which dependent variables, and which independent variables have no effects at all. In this section, I discuss the results from the six analyses in light of these aims.

### I) Increased explained variance

Does the explained variance increase when I add more independent variables to the model?

The results from the analyses show that the explained variance in the dependent variables increases, in some cases substantially, when more independent variables are added to each analysis. An interesting finding is that Young's independent variables explain much more of the variance in the dependent variable compliance than Zürn's variables do. This indicates that Young's independent variables are better at explaining compliance than Zürn's independent variables are. But it could also be that RA 47 compliance mechanisms, the variable used by both Young and Zürn (but added to model 1 with Young's independent variables) is the variable with the most explanatory value when it comes to compliance. The relatively strong and significant estimated effects of this variable also support this.

My analyses also show that Zürn's independent variables explain more than half of the variance in both of Young's dependent variables, goal attainment and problem change. This indicates that explaining regime effectiveness with only two independent variables (RA 47 compliance mechanisms and RA 49 compliance approach, the two independent variables in Young's analysis) is insufficient and that more independent variables are needed. This is

perhaps due to the relatively more complex nature of regime effectiveness compared to compliance. The analyses of Young's dependent variables show that factors such as non-state participation (RA 30), the legal nature of the rules (RA 11) and the autonomy of decision-making bodies (RA 33) (variables used by Zürn) affect regime effectiveness.

### II) Controlled effects – identifying robust results

Do some of the effects resulting from the bivariate analyses of Young and Zürn lose their significance when controlling for other independent variables? The results from my six analyses show that many fewer variables affect compliance and regime effectiveness when *controlled* effects are estimated than when only bivariate relationships are estimated.

Most of Zürn's independent variables, except for RA 47 compliance mechanisms, have small or no significant effects on compliance. The explained variance of Zürn's independent variables on compliance is not as high as one would expect either. This indicates that several of the independent variables in Zürn's analysis have little or no influence on compliance when controlling for other independent variables. In other words, some of the independent variables that influence compliance in the bivariate analyses performed by Zürn do not influence compliance when we control for other explanatory variables.

Variable RA 49 Compliance approach, one of the two independent variables used by Young, is significant in only one of the analyses (Analysis 3, Goal attainment). This variable has bivariate effects on goal attainment and problem change (according to Young's analyses), but these effects lose their significance when the controlled effects are estimated.

### III) The estimated effects

Which independent variables affect which dependent variables?

| | RC 5 CONFORMITY | RC 5 CONFORMITY CAUSAL | RC 10 GOAL ATTAINMENT | RC 10 GOAL ATTAINMENT CAUSAL | RC 11 PROBLEM CHANGE | RC 11 PROBLEM CHANGE CAUSAL |
|---|---|---|---|---|---|---|
| Imposition of military punishments (RA 47_5) | + | | | | | |
| Transition period (RA 47_8) | - | + | | | + | |
| Capacity building (RA 47_7) | | + | | + | | + |

| | | | | | | |
|---|---|---|---|---|---|---|
| Compliance approach (RA 49) | | | + (management approach) | | | |
| Notices of violation (RA 47_2) | | | | + | | + |
| Imposition of financial/economic punishments (RA 47_6) | | | | + | | |
| Suspension of membership rights (RA 47_3) | | | | - | - | |
| Legally binding rules (RA 11) | | | | - | - | |
| Strongly independent secretariat (RA 30_4) | | | | + | | |
| Non-state actors members of negotiating body (RF 49_3) | | | | + | | |
| Standing subsidiary decision-making bodies (RA 33_3) | | | | | - | - |

Table 6.7

RA 47 Compliance mechanisms influences the dependent variable RC 5 Conformity. More specifically, military punishments have a positive effect on compliance and transition periods have a negative effect on compliance. None of the other independent variables seem to affect compliance, according to my results.

RA 47 Compliance mechanisms, in particular capacity building and transition period, positively influence the dependent variable RC 5 Conformity causal.

RA 49 Compliance approach influences the dependent variable RC 10 Goal attainment. The result supports that a management approach to compliance positively influences goal attainment.

RA 47 Compliance mechanisms influences the dependent variable RC 10 Goal attainment causal. More specifically, capacity building, notices of violation and use of financial and/or economic punishments have a positive influence on the regime's causal influence on goal attainment while suspension of membership rights has a negative influence. RF 49_3 Non-state actor – member of negotiating body has a positive influence on regimes' causal influence on goal attainment. RA 11 legally binding rules and RA 30_4 Strong independence of the secretariat have a negative influence.

RA 47 compliance mechanisms influences the dependent variable RC 11 Problem change. Suspension of membership rights negatively influences the problem while transition periods positively influence the problem. Legally binding rules (RA 11) and a standing subsidiary decision making body (RA 33_3) negatively influence the problem.

Notices of violation  and capacity building (RA 47) influence the dependent variable RC 11 Problem change causal positively, while having a standing subsidiary decision-making body (RA 33_3) negatively influences the regimes' causal influence on problem change.

Not counting the three variables that are excluded from the analyses due to mulitcolinearity (RA 12, RA 46 and RF 19), there are two independent variables that have no significant effects on any of the dependent variables, according to my results. These are RA 13 Rule differentiation and RA 45 Reporting procedures. These are both independent variables used by Zürn in his analysis of compliance.

### 6.4.1 Support for the hypotheses?

My results partly support Zürn's hypotheses 1: "Incentives improve compliance rates" and 4: "Responsiveness to problems of implementation improves compliance rates". This is due to the significant positive effects of the variable RA 47, compliance mechanisms, which operationalizes both "incentives" and "responsiveness" on compliance. Military punishments (negative incentive) affect compliance positively, while the effect of transition periods (positive incentive) on compliance is actually negative. This reveals that not all incentives improve compliance rates, and that my results therefore only partly support the hypotheses. None of Zürn's other hypotheses gain support from my results.

My results mostly support the hypotheses created by me based on the theoretical assumptions accounted for in Young's chapter. The many positive effects of RA 47 compliance mechanisms on both compliance, goal attainment and problem change support hypotheses 1 "Mechanisms capable of generating rewards and penalties improve compliance rates" and 2 "Mechanisms capable of generating rewards and penalties improve regime effectiveness". The results show that positive and negative compliance mechanisms are important for compliance and for regime effectiveness. This supports the view of the enforcement school.

My results partly support hypothesis 3 “Operation of compliance mechanisms, but not necessarily the use of penalties and rewards, improve compliance rates”. Capacity building has a positive effect on compliance, but granting a transition period to the parties has a negative effect on compliance. Hypothesis 4 “Operation of compliance mechanisms, but not necessarily the use of penalties and rewards, improve regime effectiveness” gains support from my results. The effects of capacity building are positive and significant on both compliance, and regime effectiveness. Granting a transition period also positively influences regime effectiveness. My results thus support the views of the management school.

My results do not, however, support hypotheses 5 “There is no clearcut relationship between compliance mechanisms and compliance rates” and 6 “There is no clearcut relationship between compliance mechanisms and regime effectiveness”. The effects of RA 47 compliance mechanisms on both compliance and regime effectiveness support that there *is* a relationship between compliance mechanisms and compliance, and compliance mechanisms and regime effectiveness. In fact, the data show that these relationships are clear and strong. Thus, my results do not support the views of the social-practice perspective.

### 6.4.2 Enforcement or management?

My results provide no clear indication of which approach to compliance is the better one. The results from one analysis (analysis 3) favor the management school. Founded on the theoretical arguments of the two schools, it is fair to assume that about four of the categories on RA 47 compliance mechanisms correspond with enforcement school assumptions (notices of violation, suspension of membership rights, military punishments and financial/economic punishments), and two categories correspond with management school assumptions (capacity building and transition period). The table below presents the frequency of the moderate to strong effects of these compliance mechanisms in the six analyses:

| | Enforcement school – compliance mechanisms | | Management school – compliance mechanisms | |
|---|---|---|---|---|
| Effect on conformity, goal attainment and/or problem change | + | - | + | - |
| Capacity building | | | IIII | |
| Transition period | | | IIII | I |
| Notices of violations | | | II | |
| Suspension of membership rights | II | I | | |
| Imposition of military punishments | I | | | |
| Imposition of financial/economic punishments | I | | | |

Table 6.8

Counting effects of the compliance mechanisms and their positive and/or negative effects on compliance, goal attainment and problem change, indicates no preference for either theoretical school. However, when looking at the effects of capacity building and transition periods together with the result of RA 49 Compliance approach in analysis 3, my results give somewhat stronger support to the management school than the enforcement school. Overall, the results support a mixed approach to compliance, with the use of both positive and negative compliance mechanisms.

## 6.5 Summary

My multivariate analyses take us only a few steps closer to determining what factors contribute to the different conclusions of Young and Zürn. Nevertheless, the analyses provide at least three findings: First, adding more independent variables to Young's analyses of regime effectiveness creates more robust results; the explained variance of regime effectiveness increases substantially. Second, several of the results from the bivariate analyses of Young and Zürn are either non-existent or insignificant in my multivariate analyses, where controlled effects are estimated. In particular, most of the effects of Zürn's independent variables on compliance disappear or become insignificant when controlling for other independent variables, with the exception of RA 47 compliance mechanisms. Third, the

results from my analyses give support to both the enforcement school and the management school, but slightly favor the management school.

Together, the results from my analyses suggest that if Young and Zürn would have included all relevant independent variables and performed multivariate analyses (providing controlled effects), their analyses would have become more robust, and their conclusions possibly more similar.

# 7 Conclusion

In this chapter, I first provide a summary of my thesis (7.1) and then present the main findings (7.2).

## 7.1 Summary

In this thesis, I have examined the analyses of Oran Young and Michael Zürn in Breitmeier et al (2006) using both qualitative and quantitative techniques. My aim has been to find out what causes their differing conclusions with regard to approach to compliance.

First, in chapter 2, I reviewed theory about compliance and regime effectiveness, including their approaches to compliance: the management school and the enforcement school. I also briefly accounted for the social practice perspective on compliance.

Next, in chapter 3, I considered the analysis of horizontal compliance mechanisms and compliance by Michael Zürn. Here, I provided information about five aspects of his analysis: data, constructs, operationalization and variables, results and conclusions.

In chapter 4, I considered the analysis of compliance mechanisms and regime effectiveness by Oran Young. Again, I presented information about data, constructs, operationalization and variables, results and conclusions. The identification of these aspects of Young's and Zürn's analyses was necessary to facilitate a comparison between the two analyses.

In chapter 5, I compared the analyses of Young and Zürn on the five dimensions used as a framework in chapters 3 and 4. This comparison identified similarities and differences in order to find out why their conclusions differ. The comparison showed that two aspects of the analyses are identical, while the other aspects differ. But it failed to show clearly which of these differences (if any) caused the differing conclusions reached by Young and Zürn.

In chapter 6, I performed six multivariate regression analyses of compliance and regime effectiveness using the variables from Young's and Zürn's analyses.

## 7.2 Main findings

The results from my analyses provide no clear answers to the research question of what can explain the differing conclusions of Young and Zürn. This is perhaps not so strange. If the causes of the different conclusions were obvious and clear, the authors themselves probably would have spotted them while writing the book.

However, my results do provide at least five possible reasons why the conclusions of Young and Zürn differ:

First, my qualitative comparison of the analyses of Young and Zürn in chapter 5 shows that higher construct validity could perhaps have led to more similar results and possibly more similar conclusions.

Second, in research in general, researchers sometimes interpret results differently. I have found indications pointing to the fact that Young and Zürn have interpreted quite similar results from their analyses differently, with Young tending to focus more strongly on the results associated with the management school and Zürn tending to focus more strongly on the results associated with the enforcement school. This could contribute to the differing conclusions to a certain extent.

Third, my statistical analyses in Chapter 6 show that Young could have included more independent variables in his analyses of regime effectiveness to increase the explained variance. By including independent variables that explain more of the construct regime effectiveness, his results and conclusions would have become more robust.

Fourth, several of the results from the bivariate analyses of Young and Zürn either disappear or lose their significance when I estimate controlled effects in my multivariate analyses. For instance, most of the effects of Zürn's independent variables on compliance, with the exception of RA 47 compliance mechanisms, have no effects on compliance according to my results.

Together, the third and fourth finding suggest that if Young and Zürn would have included all relevant independent variables *and* performed multivariate analyses (providing controlled effects), their analyses would have become more robust, and their conclusions possibly more similar.

Finally, my results give support to both the enforcement school and the management school, although slightly favoring the management school. Overall, my results support a mixed approach to compliance with the use of both positive and negative compliance mechanisms.

# List of References

Bang, Guri, Jon Hovi og Detlef F. Sprinz (forthcoming): "Why the United States Signs Yet Does Not Ratify Multilateral Environmental Agreements".

Barrett, Scott (2003): *Environment and Statecraft – The Strategy of Environmental Treaty-Making*. Oxford: Oxford University Press.

Barrett, Scott (2008): "Climate treaties and the imperative of enforcement" in *Oxford Review of Economic Policy* 24 (2), pp. 239-258.

Barrett, Scott and Robert Stavins (2003): "Increasing Participation and Compliance in International Climate Change Agreements" in *International Environmental Agreements: Politics, Law and Economics* (3), pp. 349-376.

Breitmeier, Helmut, Oran R. Young and Michael Zürn (2006): *Analyzing International Environmental Regimes*. Cambridge: MIT Press.

Chayes, Abram and Antonia Handler Chayes (1993): "On Compliance" in *International Organization* 47 (2), pp. 175-205.

Christophersen, Knut-Andreas (2007): *Databehandling og statistisk analyse med SPSS* (3. ed.). Oslo: Unipub.

Downs, George W., David M. Rocke and Peter N. Barsoom (1996): "Is the Good News about Compliance Good News about Cooperation?" in *International Organization* 50 (3), pp. 379-406.

Halpin, Brendan (2003): "Multinominal and Ordinal Logistic Regression – Ordinal Dependent Variables". Downloaded from http://teaching.sociology.ul.ie/SSS/lugano/node74.html, 01.11.10, 12:40 pm.

Helm, Carsten and Detlev Sprinz (1999): "The Effect of Global Environmental Regimes: A Measurement Concept" in *International Political Science Review* 20 (4), pp. 359-369.

Helm, Carsten and Detlev Sprinz (2000): "Measuring the Effectiveness of International Environmental Regimes" in *The Journal of Conflict Resolution* 44 (5), pp. 630-652.

Hovi, Jon (1998): *Games, Threats and Treaties.* London: Pinter.

Hovi, Jon, Detlef F. Sprinz and Arild Underdal (2003): "The Oslo-Potsdam Solution to Measuring Regime Effectiveness: Critique, Response, and the Road Ahead" in *Global Environmental Politics* 3, pp. 74-96.

Hovi, Jon and Ivar Areklett (2004): "Enforcing the climate regime: Game Theory and the Marrakesh Accords" in *International Environmental Agreements: Politics, Law and Economics* 4, pp. 1-26.

Hoyle, Rick H., Charles M. Judd, and Monica J. Harris (2002): *Research Methods in Social Relations*. Fort Worth: Wadsworth.

Krasner, Stephen D. (1982): "Structural Causes and Regime Consequences: Regimes as Intervening Variables" in *International Organization* 36 (2), pp. 185-205.

Torra, Vicenç, Joseph Domingo-Ferrer, Joseph M. Mateo-Sanz and Michael Ng (2006): "Regression for ordinal variables without underlying continuous variables" in *Information Sciences* 176, pp. 465-474.

Underdal, Arild (2002): "One Question, Two Answers", chapter 1 in Edward L. Miles et al: *Environmental Regime Effectiveness. Confronting Theory with Evidence*. Cambridge: MIT Press.

Winship, Christopher and Robert D. Mare (1984): "Regression Models with Ordinal Variables" in *American Sociological Review* 49 (August), pp. 512-525.

Young, Oran R. (1989): *International Cooperation – Building Regimes for Natural Resources and the Environment*. Ithaca: Cornell University Press.

Østerud, Øyvind (2005): *Statsvitenskap – Innføring i politisk analyse* (3.utg.). Oslo: Universitetsforlaget.